MINUTES
REGIONAL RESOURCE STEWARDSHIP COUNCIL
MEETING

May 10-11, 2006
Knoxville, Tennessee

Present
1. Mr. Jimmy Barnett
2. Mr. Mike Butler
3. Mr. Austin Carroll
4. Mr. Phil Comer
5. Mr. Kenny Darnell
6. Mr. Karl Dudley
7. Mr. Bill Forsyth
8. Mr. Jim Fyke
9. Mr. Don Gowan
10. Dr. Kate Jackson (DFO)
11. Mr. Tom Littlepage
12. Ms. Miles Mennell
13. Mr. W. C. Nelson
14. Mr. Bruce Shupp (Council Chair)
15. Mr. Bill Tittle
16. Mr. Tom Vorholt
17. Mr. Dave Wahus (Council Consultant)

Absent
18. Mr. Jim Jared
19. Senator Tommy Ed Roberts
20. Mr. Joe Satterfield
21. Mr. Greer Tidwell, Jr.
22. Ms. Rosemary Williams

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Approved by _(Originally signed by Bruce Shupp)___
Chair

REGIONAL RESOURCE STEWARDSHIP COUNCIL MEETING

MAY 10, 2006

VOLUME I OF II

LOCATION:

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P R O C E E D I N G S

CHAIRMAN BRUCE SHUPP: Take your seats, please. Good morning. Welcome to the spring 2006 meeting of the Regional Resource Stewardship Council.

I am Bruce Shupp, Council Chair. This is Dave Wahus, our facilitator. And our first speaker this morning, as you-all know, is Kate Jackson, TVA Executive Vice President.

Kate.

DR. KATE JACKSON: Gosh, that was

quick.

CHAIRMAN BRUCE SHUPP: That's quick. We're behind.

DR. KATE JACKSON: Am I supposed to be that quick? Am I making up time? Was that a nay?

Good morning, everybody. Thank you for being here. I just wanted to note that -- my appreciation of your -- all of your being willing to serve this additional year. We very much wanted to make sure that all of you had the same opportunity to have a two-year cycle on the Council, and that's why we extended you. Thanks for signing up yet again.

Bruce asked me to talk about a few things. So I will do that and I will pause kind of between topics in case there are some questions. I am not as concerned about the time as you are apparently.

CHAIRMAN BRUCE SHUPP: We're fine. We're fine.

DR. KATE JACKSON: Okay. Board restructuring is one of the things that Bruce asked me to just say a bit about.

You-all know that there's a Governance Bill that passed and as new board members were nominated and confirmed, we shifted to the new governing structure. So we have six additional board members who have been appointed.

I can go through their names and affiliations if anyone likes. I suspect you have all read it in the newspaper enough times.

Their first board meeting happened a month or so ago, and at that first meeting Bill Sansom was elected the Chair. Bill Baxter made it clear at that meeting that he felt that there should be a bright line of delineation between the old governing structure of three full-time operating managing directors to the part-time board. So he

suggested that nobody that served on the existing board full-time should be available to be the chair of the new board. So Bill Sansom, a Knoxville businessman, is the Chair.

Bill Sansom then made some very interesting statements about this world of the new Board is going to be different and it's going to be different for the Board members and it's going to be different for employees and it's going to be different for all of the stakeholders that TVA serves, that this part-time Board is going to focus on governance and policy issues. They are not going to focus on day-to-day activities. They intend to provide guidance and vision and direction for the Agency, but they intend for TVA to manage the day-to-day business.

In so saying, they nominated, they chose, they ordained, I guess, Tom Kilgore, who was up to then the president and COO, Chief Operating Officer, to be the acting Chief Executive Officer, recognizing that they are probably going to do a search for a CEO, but they didn't want -- with all the other pressures of getting themselves organized, they didn't want that to be something that they needed to focus on instantaneously, recognizing that they needed somebody to be making day-to-day operational decisions about TVA.

So Tom Kilgore is the acting CEO. So he's kind of got, you know, two or three jobs, which I look at as being an overhead reduction achievement. If we can all do three jobs, that would be great.

So he also talked about they were actively writing Bylaws. TVA has never had Bylaws, which means, you know, the rules of how we do stuff. We have never felt the need apparently.

They also nominated or made a decision that one of the Board members would take the lead in

drafting those Bylaws. They decided that their next board meeting, which will be May 18th in Hopkinsville, would also probably include a hearing. I wanted to note that specifically.

The Governance Bill provides them an opportunity to have fairly traditional hearings. So they can have panels, not quite subpoena people, of course, but invited speakers to talk on particular topics.

The hearing topic is going to be all the issues of transmission access and rates in Kentucky. So they're actively inviting folks to come and speak on that topic on May 18th.

That's also TVA's birthday, by the way, May 18th. Maybe that's auspicious, I don't know.

So they will also at that May 18th meeting probably talk about the committees that they are going to establish. In the Governance Bill they are required to have a couple of committees. They have to have a compensation or HR committee. They have to have an audit committee. I think those are the only two specifically named.

MR. BARRY WALTON: I believe so.

DR. KATE JACKSON: They will probably have some others, you know, looking at operations or looking at other issues, and I don't know what those are at this point. So they will populate those committees potentially. They will talk maybe about charters of those committees. They will hope -- we hope pass their Bylaws. Then they can be up and running and they can charge off and do things.

I know that they have been very active. Many of them have begun touring. Some of them have begun talking to customers and other stakeholders.

So I think with that, I will just ask

if anybody wants to ask any questions, which I probably cannot answer.

Austin?

MR. AUSTIN CARROLL: My understanding is the hearing on 18th, next Thursday, is supposed to start at 10:00.

DR. KATE JACKSON: 10:00.

MR. AUSTIN CARROLL: And then the Board meeting is at 2:00.

DR. KATE JACKSON: I think that's right. We have not yet published the agenda. Any second now we will publish the agenda, but I think that's right.

MR. BARRY WALTON: That's consistent with what I heard a week ago, but nothing is final until they decide it and publish it.

CHAIRMAN BRUCE SHUPP: Any other questions?

DR. KATE JACKSON: Now, my next assignment. We consolidated resource stewardship, that function, which Bridgette Ellis was the vice president of, with the environmental policy and planning function, which John Shipp, before he retired, was the vice president of.

Bridgette, in the interim, had been acting in the other position. Again, you know how I like having everybody do two jobs. We consolidated those two functions to more fully integrate and align environmental policy with environmental application on the ground.

We have created a new organization, environmental, I knew I would do this, stewardship and policy. Sorry, I'm not used to that yet, and Bridgette Ellis is the senior vice president of that function. She has been doing a spectacular job, not just deploying those responsibilities, but also integrating the functions to ensure that not only do

we have all of the subject matter experts on archeology and zoology but also the policy experts who can be thinking about air, land and water all in a combination.

So with that, I am going to pause for a second and see if anybody has got any questions.

Is Bridgette in here, by the way? There she is. I just wanted to make sure she heard me say something nice about her.

MS. BRIDGETTE ELLIS: I appreciate that.

DR. KATE JACKSON: Okay. My third assignment is to talk a little bit about our stewardship activities and how they compare with the stewardship activities that we had when we had federal appropriations, kind of wanted me to do a bit

of a retrospective, I think.

So TVA's funding for stewardship activities historically came from three sources, federal appropriations, non-power revenues, things like agriculture, leases, timber sales, user fees, and also power revenues on the projects that were multipurpose. Remember that many of these projects have a power facility. They have a lock. They have a recreation area.

So as each of those projects was closed, the president made a determination as to the percent of the benefits from that federal project that flowed to the ratepayers versus the taxpayers and divied up that percentage. So historically the power program did fund some portion of those activities that went on on the dam reservations.

In 1998 our -- the Public Law 105-62, which was the Energy and Water Development Act of 1998, required TVA to fund our non-power programs that constitute, and I will put this in quotation marks, "Essential stewardship activities with power

revenues and other funds to the extent that appropriations and non-power revenues were insufficient."

So that legislation and our interpretation of that essential stewardship activities was to include and be limited to the types of stewardship activities that we were receiving appropriations for at the time that legislation was enacted.

So those things are navigation, dam safety, reservoir operations, reservoir release improvements, watershed teams, water supply, plant management, shoreline erosion, stabilization and management, land management, recreation, national heritage, cultural resource. So, in general, we are still conducting those stewardship activities at a similar level as 1999, the last year we got those appropriations.

Now, in some areas though we have changed the way we deliver those services either to look for efficiencies or to apply new learning or to address changing needs from the resource or the public. We have consolidated land and water stewardship functions to provide sort of a one-stop shop maybe to the watershed teams.

We have consolidated watershed teams from eleven to seven for organizational and cost savings, reducing facility costs and having fewer managers, that kind of thing.

Increased recovery of administrative costs for land use request, just that, you know, following that same path that we had been on, having the users that drive the cost shoulder a greater portion of those costs, and increasing use of partnerships to get better stewardship benefits.

We have incurred additional costs. You will fondly remember, I'm sure, the Reservoir

Operation Study. So there are some years where that number went up and down.

Now if I could have that slide pop up. Okay. So this shows a graph. You can see this sort of pale teal color is the non-power expenditures and the power monies. Those numbers have changed a bit over time. I can talk a little bit about kind of how that flow of dollars has changed.

1999 was the final year for new appropriations. In 2000 we reduced some of our land planning activities, increased shoreline stabilization, increased some activities in watershed teams, and navigation work went down a bit back to sort of historic norms.

In 2001 dam safety and navigation, O&M money, Operations and Maintenance, spending went down. Dam safety activities are driven -- you'll

hear a little bit more about this morning. They are driven largely by what we find out there, the schedule of dam safety inspections. So as those things come and go, we do increase maintenance activities or increase capital activities or decrease as time charges forward.

2002, increasing dam safety, and it includes about $5.7 million expenditure for the Reservoir Operations Study, which is kind of a floater on top of the rest of the budget.

In 2003 there was about $8 million in there for the Reservoir Operations Study.

In 2004 there was an increase in dam safety money, a little more than a million in Reservoir Operations Study money, and some capital for the reservoir release improvement activities that were driven from the ROS.

2005, there's some capital in there for, again, those reservoir release improvements.

2006, that number is coming down

because of the capital. We're not investing the capital any more for RRI. That stuff is all done.

Questions on that?

MR. AUSTIN CARROLL: What were those improvements again, just briefly?

DR. KATE JACKSON: One of the commitments that we made in the Reservoir Operations Study is that we would not lose any of the benefits that we had achieved from the lake improvement plan and that the monies that we spend at the projects to improve dissolvable oxygen content.

So as we raise those winter levels and held the summer levels longer, we have had to not only go back and prop up some of the capital that we had invested in those facilities for the surface pump and the weirs and all that sort of stuff, we had to install a bunch of additional things.

So in total we have spent $56 million roughly on the dissolved oxygen and we got maybe four, three left, something like that.

Did that answer your question, Austin?

Jimmy.

MR. JIMMY BARNETT: One question. You know, we talked about weeds there for a long time, particularly in Guntersville. How is that situation right now?

DR. KATE JACKSON: The situation, especially this year, when we have very low flow and relatively warm water, it's going to be bad. You know, those are aggressive species, and there are new species joining them and it is not a good situation. We work very hard, as you-all know, with a stakeholder group in that area. We are confining our activities to 3,000 acres of treatment, mostly -- is that right, Bridgette?

MS. BRIDGETTE ELLIS: Yes.

DR. KATE JACKSON: Mostly that's, you

know, cutting lanes into commercial marina areas. We don't treat in front of people's homes. We expect people to do that, but that is a bone of contention, as you well know.

MR. JIMMY BARNETT: I thought maybe Wayne had come up with a magic wand or something he could wave.

DR. KATE JACKSON: All the magic wands are illegal, and there are people beside you here who regulate those magic wands.

MR. DON GOWAN: Kate, there's still some confusion out there amongst watershed groups and so forth as to whether TVA dollars are federal or non-federal, and I recognize it is non-federal but sometimes it's still treated as federal, particularly as match on grants and so forth.

Can you help me with that?

DR. KATE JACKSON: I think you have

stated it adequately. We have that same problem, and that's true whether we're pursuing money from the Department of Energy to look at some new energy-based technology or matching money on grants, federal grants for water, we always have that problem.

And Barry, I don't know if you want to say anymore.

MR. JIMMY BARNETT: That was pretty good. Let me just say, just like Kate said, I have never been able to answer that question across the board. What I tell our people is just always when they're in a grant matching funds type situation, just lay out the facts, don't hold anything back, because some of the statutes for some of the grants might have or those other agency's interpretations might make our funds eligible or they might not.

We're federal, we're a federal agency, so any money we have is federal funds in that sense, just like if someone steals my briefcase, the FBI

comes after them because they have committed a federal offense of stealing federal property, but we're non-appropriated, you know, they are from a different source. So, anyway, there's no answer to that question across the board.

MR. DON GOWAN: Thank you.

DR. KATE JACKSON: You just said it with more words very legally.

MR. BARRY WALTON: I think you're right.

CHAIRMAN BRUCE SHUPP: Any other questions? All right.

DR. KATE JACKSON: Okay. One other thing that I want to note is that I may get dragged out a couple of times today working on some other things. As I depart Janet will be the Designated Federal Officer and step in and be me. Okay.

CHAIRMAN BRUCE SHUPP: All right. We're going to move on to the River Operations Study update with Steve Adams, who is the manager of river scheduling. Steve.

MR. STEVE ADAMS: All right. Thank you, Dave. TVA implemented a new reservoir operating policy about two years ago, and several of you are already familiar with and understand this new operating policy, as you were actively involved in the development of this policy. We want to thank you once again for your input as we went through that process.

Several of you are new and may not be as familiar with that policy. So what I want to do

is, first of all, give you a quick overview of the study that was done and then talk about the changes we made as a result.

The study was initiated in October of 2001. This was a comprehensive look as how we operate all of our dams and reservoirs. The purpose

was to look at our existing operating policy and see if we could make some changes that would produce greater overall public value.

We got a lot of input as a part of this study. We got a lot of input from the public, agencies, from a lot of others. Out of all this input, we developed alternatives to evaluate. We did a lot of analyses on these, technical analyses. Out of all of this work was a recommended alternative that was approved by our Board of Directors and then implemented in May of 2004.

So we have a new operating policy. You know, what changes can you see as a result of this new policy?

A couple of the most obvious changes are how we operate our tributary reservoirs. First, there will be a limited drawdown between June 1st and Labor Day for ten of the reservoirs. This is an extension over our previous policy by one month.

Under our previous policy, we held the reservoirs up and had a limited drawdown through the end of July.

Now, I just want you to note that our policy does not call for a steady reservoir level between June 1st and Labor Day but calls for a limited drawdown from that time. So that means that the reservoir levels will drop some between June 1st and Labor Day.

Now, this limited drawdown is subject to providing limited or minimum flow requirements downstream. Each of the individual tributary reservoirs have minimum flow requirements, and these are for a variety of purposes, including water supply, navigation, improving aquatic habitat. So these will be provided.

There are also system minimum flow requirements during this period downstream at

Chickamauga Dam, and I will talk more about those requirements at Chickamauga in just a few minutes.

The second big change is that we raised the winter operating zones on 11 reservoirs. This means that the winter levels at these reservoirs will be higher than they were in the past.

Some details on these changes can be seen in this slide. The first left-hand column shows

the 11 projects. The next column shows the increase and the winter levels for these 11 reservoirs and compares them with our previous operating policy. The right-hand column shows the increase and the elevations for Labor Day compared to our previous policy.

So you can see there are a wide range of changes or increases between the projects bearing from January 1st. Our winter levels are 5 feet at Chatuge to 17 feet at Hiwassee.

You might ask yourself after looking at this, you know, why is there such a big difference in these increases at all of these projects, and the reason is that in the past, our past operating policy, we did not treat all of the reservoirs equitably.

So this new policy is our collective attempt to try to treat each of the reservoirs equitably and to provide the benefits in a more balanced manner. We're going to try to manage our inventory better.

I mentioned that we increased winter pool levels at 11 projects, but we had extended the limited drawdown in the summer to ten reservoirs. You can see here on the Boone project we have a zero

increase on Labor Day. In our previous operating policy we had already held Boone up to higher levels through Labor Day. So there was no need to make a change in our new policy.

Now, this is a plot of tributary system operating guide. I'm showing you this because it shows -- it's a good way to show and see how we operate our ten major tributary reservoirs as a system.

Although, what's shown on these plots is a cumulative storage for the ten tributary reservoirs, what I want to focus on is how and why these curves change throughout the year and also how these curves provide bounds on how we operate on the tributary reservoirs as a system throughout the year.

Operating the system with this system operating guide is a new concept that came out of the Reservoir Operations Study, and we're using this to help, again, provide more balance in operating our reservoirs.

So, first, the blue curve, this is our -- what we call our flood guide, and this provides an upper bound on operations throughout the year.

You can see in the winter, in the

wintertime we start off the year and the reservoir storages are low. This corresponds to relatively low reservoir levels in the winter.

In the spring we begin our fill up to summer levels where the reservoir storage is the highest. And, of course, it also corresponds to higher reservoir levels. Then again in the fall we draw the reservoirs down back to the winter operating levels.

The reason the levels in the winter are low is this is when our -- we have our highest rainfall months. So we need this additional storage to be ready for flood events. The risk for flooding is less in the summer. So we can maintain our reservoirs higher. And, of course, this also

provides us recreation benefits in the summer, and this also provides us storage for providing minimum flows later on in the year when rainfall may not be as plentiful.

If we get above this flood guide, that means we're encroaching on our flood storage space, and we operate to try to get back down below this blue curve as soon as we can without increasing downstream flood damage.

Now, the green curve is our minimum

operating guide. This provides a lower bound on our operations. In general, if we're near this green curve we're experiencing -- probably experiencing dry conditions. If we actually get below this curve, we shift to water conservation mode, and that means we only release enough water from the tributary reservoirs to provide minimum flows for projects or for the system requirements downstream.

So both of these curves provide bounds on how we operate during the year. We try to operate and stay in between those two curves. So, again, we try to stay below the blue curve so that we have enough flood control space to be ready for flood events. If we get above that, we try to draw it back down as soon as we can.

On the lower side, the green curve, that means we're probably in dry conditions. If we get below that, we go to water conservation mode and provide minimum flows only.

If we're in between the two curves, we have more discretion in how we can make our releases from a project to achieve the maximum overall system benefits.

Another big change based on our -- and a new operating concept that came out of the

Reservoir Operations Study is that our reservoir operations are now more flow based instead of being

elevation based as in the past.

Between June 1st and Labor Day our reservoir systems primarily driven by flow requirements at Fontana -- I mean at Chickamauga. Excuse me. And we did this because we looked at several ways of operating our system during the study, looked at several alternatives, looked at elevation based and flow based, and we found that placing specific flow targets at Chickamauga between June 1st and Labor Day provide the best way for us to maximize the overall benefits for the system.

Now, this slide shows the actual specific flow requirements at Chickamauga, and it kind of depends on whether we're above or below that system minimum guide that I showed in the previous plot. That was the green curve. If we're above the green curve, we operate on this blue curve right here. Like I say, again, this is between June 1st and Labor Day.

So we would start off with a flow target under those conditions of about 14,000 cubic feet per second, and that increases to August 1st where we increase the average flow to about 29,000

cubic feet per second at Chickamauga.

Now, if we're below that green curve, we're probably experiencing dry conditions and we're providing minimum flows, we'd go on this black line, this lower curve here, which is about 13,000 cubic feet per second all the way from June 1st to August 1st. On August 1st we jump to 25,000 cubic feet per second.

So flow releases are made at those ten tributary projects and other tributary projects in order for us to meet these flow requirements at Chickamauga, and we do that in a balanced manner, as I had mentioned earlier. I am going to talk a little

bit about how we do that balancing between the reservoirs in just a few minutes. So each of the reservoirs then -- the tributary reservoirs provide a portion of these minimum flow requirements at Chickamauga.

Okay. I have mentioned the two primary changes you can see on the tributary reservoir system. Now, I want to mention some of the major changes that you can see on our main river reservoirs or those reservoirs that are on the Tennessee River.

First is we implemented a new fill

policy for Ft. Loudoun, Watts Bar and Chickamauga. This provides additional flood protection for Chattanooga. It also enhances the fishery benefits for those reservoirs.

We extended summer operating zones on these reservoirs, and we did that primarily for recreation benefits. We also raised the minimum winter pool elevation at Wheeler to aide in navigation.

Other changes that we made include in providing expanded, dependable schedule releases for these projects. These were for recreation, primarily for floating and fishing in the downstream tailways. We also increased flow below Kentucky Dam to benefit navigation.

We also provide continuous minimum flows in the 17-mile stretch between Appalachia Dam and the powerhouse where we did not provide continuous flow in the past, and we did this primarily to enhance the aquatic habitat.

So this is a little description of the changes -- the major changes that we made for our new operating policy, and now I would like to talk a little bit about how we have done. So I want to show

you some information from 2004, 2005, and thus far

how far we have gotten in 2006.

This plot shows our rainfall and runoff for 2004. These upper two curves are rainfall. The dash line is the normal rainfall that we would expect throughout the year. The solid curve is our actual observed rainfall.

The lower curves, the blue curves, are our runoff. The runoff is that portion of the rainfall that actually makes it to our streams, rivers and reservoirs. So it's only a fraction of the rainfall that we see. And again, the dash line is the normal runoff and the solid line is the observed values, and these values are in inches.

One thing you might notice in 2004 is we started off fairly dry. You can see this solid curve is well below the normal curve. You might remember in September we had a couple of hurricanes come through, Ivan and Francis, and we got quite a bit of rain out of those, actually almost -- you can see almost ten inches of rain or so in September and that got us back up to close to normal values.

Then in December we received a lot of rain. Actually, it was one of the most -- one of the wettest Decembers that we have experienced, and we ended the year with higher rainfall than normal. So

you can see things change quite a bit and quite quickly through the year.

One thing you might notice is that, especially here in September, where we had a lot of rainfall, if you look at the corresponding runoff, it's not hear as much. You might wonder, you know, why is that. That's because, especially in the summertime and the spring and in the fall, there's a lot of plant growth, a lot of leaves on the trees. These soak up a lot of the rain that comes down. The rain that does hit the ground, when it's running off

to the rivers, it's impeded and slowed down by all of this growth. More of it can soak into the ground. So relatively small portions of the rainfall that hits the ground during those times actually gets into the river constraints.

Now, in the wintertime we have more portion of the rainfall that hits the ground and ends up in runoff, and that's because we don't have all the plant growth. There's less to impede the water once it hits the ground. You can kind of see that in December where we had a significant amount of rainfall and it looked like pretty much a corresponding increase in runoff during that time.

Now, here is the same tributary system

operating guide that I showed earlier that shows the bounds on our operation throughout the year. Again, this is the system curve for our ten -- ten of our tributary reservoirs, with the flood guide being the top and the minimum guide on the bottom.

As I mentioned earlier, in 2004 we started off relatively dry. So you can see here this black line is the actual observed values of storage throughout 2004. So we were really close to this minimum guide. Of course, we didn't actually implement the policy until June 1st. So we were dry. We were relatively low.

Actually, we were right on the minimum guide when we started to implement the policy, but as it turned out, we got a lot of rain the weekend before we implemented the policy. As you can see, what that did was jump the storage up and we got near the flood guides. So we were in good shape throughout the summer. We actually had some pretty good rain during the summer, went above the flood guide some, came back down.

Then you can see here in September, that was when the hurricanes came through. We were

getting close to our minimum guide and that jumped up us close to the flood guide again. We stayed near

that flood guide, and then got the rains in December, which put up above the flood guide, and we ended the year at relatively high levels.

Also, we met all of our flow targets at Chickamauga during this time. The one thing I failed to mention, but I want to, we had the flow targets that I mentioned at Chickamauga. Those are specific targets. We're trying to hit those instantaneous flows. The only time or one of the times that we go above that is if there we're above our flood guide.

As I mentioned earlier, if we're above our flood guide, we need to release more water out of our tributaries to get our flood guide curve back down again. So in those weeks we actually had higher flows than our target flows at Chickamauga.

Now, for 2005 we had a dry year to start with like in 2004 and it remained dry. As you can see, we started off really low in rainfall. We got some rain in the summertime. Then once we got to the fall, especially in September and October and on into November, we were extremely dry. We ended up the year, you know, close to ten inches below normal for rainfall. So it was a very dry year.

Here again is our tributary system

operating guide. We were close to our flood guide, as you can see here, at the beginning of the year. We actually stayed close to that on filling. We had a lot of runoff in -- you remember in 2004 we had a lot of runoff at the end of the year, a lot of rain in December. So we had a lot of water in the system. This helped us in filling our reservoirs.

Again, like I mentioned, this is a dry time of year. Other things that really helped us fill the reservoirs at this time, because we are able

to meet our summer targets at our reservoirs, was we started off the year with higher winter levels than we did in the past, as we talked about earlier, and that really helped us to be able to meet our summer targets even though we had a dry year. We can meet our summer targets now with less rainfall than under our previous operating policy.

One thing you might notice, we're at the flood guide fill near August, and you might remember that the Chickamauga flow requirements increases a significant amount beginning the first of August. So that requirement is being met by the releases from our tributary reservoirs.

So you can see the reservoirs were drawing down to meet that requirement. We didn't

have the hurricanes in the fall and we didn't get a lot of rainfall like we did in 2004. So our reservoirs continued to draw down throughout the fall down to our winter levels.

Now, for 2006. 2006 has already provided us a lot of challenging conditions and reminded us how quickly things can change. We started the year off like we did in 2004 and 2005 very dry.

As you can see, the February and March period we got very little rainfall. Actually, if you look as those two months totals, February and March, that was the second lowest total for those two months in the 117 years that we have been keeping records. So it was extremely dry.

You might remember reading in the paper sometime at the end of March, first of April, we issued a press release talking about the dry conditions. We just said it's dry. We expect it's going to continue to be dry. It looks like we may not be able to meet summer targets unless we got significant rainfall, you know, several weeks of

significant rain.

Well, wouldn't you know, you know, a few days after we issued that press release we

started getting some rain. In April we got about 160 percent of our normal rainfall. So the rains that we said we needed, we started getting. We were able to -- we got -- as you can see, again, we got a lot of rainfall, but it didn't really affect the runoff a huge amount. Again, that's because of all of the plant growth. We got some increase in the runoff, but it was not near as much as the increase in the rainfall.

How this effected our tributary system operating guide, you know, we started the year close to our flood guide. Then in February and March, as I mentioned, it was dry. We actually got over at the end of March right on our minimum guide.

We were actually operating under water conservation mode starting at the end of February in our tributary reservoirs. We were only releasing enough water to provide our minimum flow requirements, because we knew it was dry and we wanted to give ourselves the best opportunity to reach our summer targets by June 1st.

So we were already operating under minimum flow conditions. We started getting the rain in April. As you can see, the values actually got up closer to the flood guide by the end of April. So

this rain helped quite a bit.

One thing that you will see is this rainfall that we received in April was not really well distributed over our area. So some reservoirs got more rain than others, and I will talk about this in a minute.

We hit our targets for some of our reservoirs, our summer targets, but some are still -- it's uncertain that they are going to make it to

their summer levels.

An important thing to remember, again, is that the reason we're -- that we're in the shape we are in right now because we started the year off at higher levels again, you know, we start the year with higher winter levels than we did in the past. So it helps us in reaching our summer targets, and this is another good year to show that.

I wanted to give you a couple of examples of the reservoirs, the individual reservoirs, how they've done this year. Norris is a reservoir where we actually got a lot of rainfall in the watershed. So this is a plot of elevation throughout the year.

Again, we have a flood guide shown here, and we have another curve down here, and this

is not the minimum guide, this is what we call a balancing guide. I had mentioned earlier that what we try to do, especially between June 1st and Labor Day, is to balance the reservoir operations for our ten tributary reservoirs in providing the minimum flows downstream. We do that by using this balancing guide.

Say we're halfway in between the balancing guide and the flood guide; that is, a balancing ratio, we calculate a balancing ratio, and that would be .5. If we were three-fourths of the way between the balancing guide and the flood guide, our balancing ratio would be .75.

We calculate that for all the ten tributary reservoirs, and we try to keep those ratios the same so that relatively speaking, between the flood guide and the balancing guide, all the ten reservoirs are at the same position. So that's how we do our balancing of our tributary reservoirs in providing minimum flow requirements downstream.

On the Norris project the summer

target elevation is 1020. As you can see here, we actually reached that on May 1st. So the reservoir elevations on Norris are in good shape this year.

Now, one reservoir where the

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elevations are not in as good a shape is the Fontana project. As you can see, we're right here, which is a little bit below 1690 and our target elevation for the summer are 1705. So we're over 15 feet still from reaching our summer target at Fontana.

Also we're struggling to reach several other reservoirs. I mean, most of our tributary reservoirs are in good shape in terms of summer levels right now, but we are uncertain about Fontana, as I mentioned right here.

Also Hiwassee, Chatuge, Nottely and Cherokee are the other reservoirs that right now we're uncertain if they will make it by June 1st. We still need some of those rains throughout May.

So what's the outlook?

Well, we have rain in the forecast this afternoon as you probably heard about. For the next ten days we're looking at maybe an inch or so. So that's about what we've been getting over the last few weeks. It's going to be cooler than it has been or cooler than normal.

The long-term forecast is pretty much -- you can find somebody that will give you a forecast for what you want to say. That's something where there's a lot more uncertainties in the

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long-term forecast. Some people say it's going to be dry and hot. Some people say it's going to be wet and cool. The TVA meteorologists thinks that it's going to get dry and be warmer than normal this summer.

Now, what are the impacts from those things?

The reservoir elevations, as I've

already mentioned, we're in good shape on most of our tributary reservoirs, but we still have some that have not reached summer levels and it's uncertain if we will meet those.

Hydropower generation, we're only at about 70 percent from what we normally get for the year. Of course, if we have dry conditions, that will stay below normal.

Water quality, water temperature, Kate mentioned earlier that because we have been provided minimum flows in our system this spring, our water temperatures in our reservoir system are warmer than normal. One of the purposes that we -- for having high reservoir levels is this stores water, and one of the things is we're storing cold water, especially at Norris and Fontana, that's used for cooling water at our downstream coal-fired and nuclear-generating

plants. So if the water temperatures remain warm, that could cause some issues with cooling water downstream at those projects later on this summer.

Now, just about all the information I have talked about and provided this morning is on our web site, TVA.com. I mean, we have rainfall and runoff. Those plots that I showed are on that web site. That system minimum operating guide, the flood guides, that curve that I showed is on our web site, and average weekly flows at Chickamauga Dam are on there. I showed you individual operating guides for Norris and Fontana, that information is on our web site. We also have observed and predicted releases and elevations at individual projects.

So, you know, I have given you a presentation about how we're doing, but we have this information on our web site. So you can get on there yourself and see how we're doing in trying to meet our operating changes that we made with our new operating policy.

So, Dave, that concludes the presentation that I have this morning.

FACILITATOR DAVE WAHUS: Okay.

CHAIRMAN BRUCE SHUPP: Questions?

Phil.

MR. PHIL COMER: I don't have a question, Steve. I just want to make a statement to you, Steve, and to Kate Jackson and Janet Herrin, really everyone in TVA, during this past two-year period, which you have just covered, 99 percent of the people that I have heard from relative to Cherokee and Douglas Dam have spoken so favorably for TVA and the new operating procedure. It's just incredibly -- the difference is day and night compared to the way it was prior to six years ago.

I think that quite often you people, particularly Kate, you and your people, don't hear this. I mean, you know, you primarily hear complaining and gripes and so forth, but really the change in attitude on part of the local people, fishermen, tourists, and to my surprise, they particularly talk about the higher winter levels as being a very special thing, much more so than I expected people to comment favorably about the higher winter levels.

All of them comment on the fact, well, that makes it's easier, even in a dry period like we had the first two and a half months of this year, they were all aware of the fact that that additional 13 feet on Douglas made a huge difference as far

as -- and with the six inches of rain we had in the last eight days of April, we were virtually back on target, as you know, but I wanted to express the collective appreciation to the new operating procedure.

MR. STEVE ADAMS: Thank you.

CHAIRMAN BRUCE SHUPP: Austin.

MR. AUSTIN CARROLL: Since we started operating under the new guide curves, how has that affected hydro production?

MR. STEVE ADAMS: The hydro production we had in 2004, which was a wet year, we had above average hydro production. In 2005, as you saw, it was a low year in terms of rainfall, but we actually had relatively average hydro generation during that year. So, you know, based on those -- on that information, in terms of averages, you know, I haven't really seen a difference.

MR. PHIL COMER: Have you had to spill much water compared to before?

MR. STEVE ADAMS: Well, we had to spill some water -- you saw in 2004 we got well above our guide curve there at the end of the year and had to spill some projects, but it's been relatively dry. So, you know, we have not really had any flood

events, other than the hurricanes that came through in December of 2004.

CHAIRMAN BRUCE SHUPP: Tom.

MR. TOM LITTLEPAGE: Okay. Given the efforts you guys made with regard to putting the announcement out at the end of February or March and then with the information available that's on the web site, what's been the public response?

Have they indicated a concern about short-term forecast or do you feel like that people are understanding what's going on?

I'm curious to what kind of response you have been getting on those efforts.

DR. KATE JACKSON: Do you want me to take that?

MR. STEVE ADAMS: Please.

DR. KATE JACKSON: And your issue is that we put a press release out with respect to dry conditions?

MR. AUSTIN CARROLL: Uh-huh.

DR. KATE JACKSON: I think now that the reservoirs are beginning to come up, main stem is pretty much up there, two, three, four of the tribs are up. I think they don't think there's an impact, and, you know, we probably need to continue to talk

about that, unless -- you know, as Wayne Poppe keeps trying to tell me, but it could change overnight. It could change overnight. It might rain really nicely over the weekend, it might really be cold.

The issue now is the system is warm. So there may be warm impacts. We have begun talking to some of the resource state folks, ADEM and TDEC particularly, about the conditions because there may, in fact, be some habitat issues this summer. We may have some hydrothermal issues this summer on production because of relatively low flows and because of warm temperatures.

We do have a pretty good inventory of cold water in Norris, it's about average, but because the main stems are warmer than normal, that same inventory is going to have less impact as we release it. So, you know, we are looking at the operational issues.

So the general public, I think, they think everything is okay. For a more specific user group, you know, the industrial customers, our distributor customers, we do need to continue to talk until, you know, there is some change in the general hydrologic picture.

CHAIRMAN BRUCE SHUPP: Phil.

MR. PHIL COMER: The ones I heard from were very favorably impressed with the news release explaining it. Of course, I watch it every morning at 5:00 and I kept up with what was happening and empathized with your problem, no rainfall, but I got many favorable comments from the general public to

the effect, well, gee, TVA has issued this explanation. I thought it was a good idea. I think, as I say, the reaction was very favorable.

CHAIRMAN BRUCE SHUPP: Don.

MR. DON GOWAN: Yeah, two quick questions. The first one relates to hydrologic changes that have been made associated with the dams.

Have you looked at opportunities where you can mimic natural conditions for fresh water mussels and so forth downstream of the dams?

I know they have done this at different places in the U.S.

DR. KATE JACKSON: Do you want me to do that one?

MR. STEVE ADAMS: Yes.

DR. KATE JACKSON: Sure. Go ahead.

MR. WAYNE POPPY: Part of what we're looking at as we went through the full evaluation was background hydrologic conditions. So that's one way

to answer it. We continue to look at background hydrologic conditions as we look for opportunities for minor modifications here and there.

If you'll recognize, the system was built primarily to manage floods and for navigation. So by definition you go away from those background hydrologic conditions to a degree.

Fair enough?

MR. DON GOWAN: Sure. Second real quick question. There are a lot of watershed groups, Kate, and I will probably say this two or three times, they are doing great work out there for TVA. It worries me when you try to do more with less.

So I encourage those watershed teams to continue in place, you know, their workloads have gone from two watersheds to seven or eight watersheds that they are managing. So that's just a suggestion.

And the second thing is we have been

looking at opportunities to remove old mill dams and so forth. These are in the smaller tributary streams. That's another area where it would be nice if TVA would participate in that, if that would be appropriate or not, to, again, improve that hydrology, at least in the headwaters of the Tennessee Valley.

CHAIRMAN BRUCE SHUPP: Any other questions for Steve?

Kate.

DR. KATE JACKSON: Okay. I also wanted to note that, you know, we talked about kind of our performance on the ROS based on the flow conditions and where we found the reg guides, but we also made a series of commitments in the ROS that included things like studying shore birds and water foul, all the installation of the dissolved oxygen equipment that I noted, looking at the flows at Chickamauga, looking at recreational flows.

So we also not only pay employees based on their achievement of those, but we post all of that performance information on the web. So, you know, it goes back to some of the things that Phil said about that credibility, maintaining that transparency of the kinds of things that we are doing and the commitments. So I just wanted to note that, that we are tracking very carefully. We have missed a few of those, but we will look at the root cause for why we missed them.

Jimmy.

MR. JIMMY BARNETT: The question I have, generally the ROS you noted and we all realized

what a big study that would be as far as getting the software and everything out there in place to really do this thing for the whole system, including, you know, the main branch, main stem, has that software worked out to y'all's expectations?

DR. KATE JACKSON: Yeah. I think the software that Jimmy mentions is both updated water quality modeling for the reservoir water quality analysis and also the flood analysis, and, yes, we absolutely are using that moment to moment.

CHAIRMAN BRUCE SHUPP: Any other questions or comments?

Austin.

MR. AUSTIN CARROLL: Where are we on the Kentucky Lake as far as any changes there?

There was talk of a study, you know, among TVA and the Corps and that type of thing.

Is that funded?

Did it get underway?

DR. KATE JACKSON: The study that Austin refers to is a Corps of Engineers' study as requested by the elected officials in Kentucky. The Corps of Engineers, and I suspect the elected officials in Kentucky, are talking about the amount of appropriations that would be necessary to do that.

The Corps would probably need to do a flood analysis on the whole system upstream because Kentucky has so much flood storage benefit for the lower Ohio and Mississippi.

So, you know, our position is we have done a study. We have the environmental impacts of changing reservoir releases there and levels there, and we have made commitments to the resource agencies and the stakeholders and we intend to keep those.

If the Corps of Engineers were to determine that they were going to do a study, we would clearly be a participant in that study, but their study would have to show that -- you know, what the environmental impact may be and what the recreation benefit might be, economic benefit. We don't intend to make any changes. So that's not our study.

MR. AUSTIN CARROLL: Right. And it hasn't been funded yet?

DR. KATE JACKSON: Not to my knowledge.

CHAIRMAN BRUCE SHUPP: Ken.

MR. JIMMY BARNETT: When you have a period like this where you have low water flows, what determines who gets water and for what purpose water is released?

MR. STEVE ADAMS: Okay. We have already specific minimum flow requirements at various points downstream on our main river. Each of the individual project reservoirs and tributary reservoirs have individual minimum flow requirements.

So when we get in a condition where we have low rainfall, and like I mentioned, say, in late February up to -- and in some projects we're still continuing this, we are only releasing water to provide those minimum requirements that are already specified, both at the individual projects and at various points downstream.

MR. KENNETH DARNELL: So the different aspects of recreation and water quality obligations are already built into the minimum flows?

MR. STEVE ADAMS: That's right. That's right.

CHAIRMAN BRUCE SHUPP: Okay. If there's no other questions, what I would like to do is I want Dave to go over the agenda for the rest of the day and tonight and tomorrow, and then we're going to take our break early because the infrastructure discussion is about two hours and we wanted to go through that with continuity rather than breaking it.

So, Dave, if you'd do the agenda.

FACILITATOR DAVE WAHUS: Thank you,

Bruce. There is a copy of the agenda in your white folder that was on your table. So we will work from that.

Following the break we will hear a presentation on TVA infrastructure description and then stewardship. Following lunch, we will hear a presentation on current issues followed by a presentation on emergency preparedness.

About 2:15 we will take a break and then starting at 2:30 we will be hearing from external coordination. We will be hearing from three folks, Bill Tittle from Hamilton County Emergency Services. Is that Jerry or Jere McCuiston? Jere McCuiston from the Kentucky Division of Emergency Management and Mike Ensch from the Army Corps of Engineers.

At 3:30 we will -- TVA will provide a summary. Then we will review the questions that you have been asked to answer tomorrow. We will adjourn at 4:00.

At 4:15 you will have a tour of the Knoxville Emergency Operation Center that is here

within the building, and you will be explained the logistics of doing that. It's in a secure area. So you will be given information on that.

Please make a note that dinner tonight is at 6:30 rather than at 6:00, please make a note of that or you're going to be 30 minutes early, but it's at 6:30. And again, we will hear more on logistics to get to dinner later this afternoon.

Tomorrow morning, breakfast on your own. And if you're leaving tomorrow afternoon, I would recommend that you store your luggage either in your vehicle or with the bellman. If you're leaving tomorrow afternoon, then check out of the hotel before you come to the meeting.

We will start at 8:00. We will hear a

presentation around 8:15 from the Bear Creek Dam discussion. At 9:15 we will have an explanation again of the TVA questions. Then at 9:30 we have scheduled an hour of time for the public comment. That will continue for an hour or as long as the public -- we have -- the public comes in and wants to talk, maybe more or less. At 10:30 we will have a break.

Following that will be the time that we will -- you will be discussing the questions and

providing responses to the questions that TVA has asked you to respond to.

So review the questions. We will review them again together this afternoon, but I would say to keep a copy of the questions out on the table and review them at least once an hour so as you're hearing these discussions you can take notes and help to remind things -- remind you of things that you want to say tomorrow when we get to the various six questions.

At 12:15 we will have a wrap-up and talk about the next meeting. Our plan is to adjourn about 12:30 tomorrow unless we get -- we get unexpected information from the public or anything else comes up here that takes longer.

CHAIRMAN BRUCE SHUPP: Any questions on the agenda or the evening? All right. Let's break until 9:30. It's now 9:08.

(Brief recess.)

CHAIRMAN BRUCE SHUPP: Take your seats, please.

FACILITATOR DAVE WAHUS: I would like to make -- I have been asked to make one announcement before we start.

If you are planning to join us for

dinner tonight, sometime during one of the breaks or at lunchtime, please tell Sandy that, one, you're

going to dinner tonight with us and then if you need transportation, because you can't walk to the restaurant. If you need transportation, you need to tell her that as well.

You are all responsible for yourself on this one. So please take the opportunity to tell her. And if you have a spouse with you and you -- he or she is coming with us to dinner, please let Sandy know that as well so we will have the numbers.

Any questions about that?

It's up to you to tell Sandy that you're going to dinner and if you need transportation.

CHAIRMAN BRUCE SHUPP: Okay. We're going to begin our infrastructure discussion with Janet Herrin, who is the Senior Vice President of River Operations.

Janet.

MS. JANET HERRIN: Thank you and good morning. It's a pleasure today to kick off the infrastructure part of the meeting.

Infrastructure is a hot topic these days. The nation's infrastructure, it seems like a

day doesn't go by that you don't pick up the newspaper and you read something about the aging infrastructure, the water distribution system, the problem that we have exceeded the design life for a particular road or a bridge. There's always a conversation about infrastructure.

In fact, the American Society of Civil Engineers every year does a rating of infrastructure. They have been doing that for a couple of years now. They look at roads and bridges and dams and schools and water distribution systems. When you look at their report what you find is very rarely a rating greater than C and many times it's a D or even F as far as the nation's infrastructure goes. So it's

very much a hot topic.

And for those that are in the resources field, it's become an extremely hot topic over the past year. Everybody is well aware of Hurricane Katrina and what happened in New Orleans.

We had some levy breaks, and I won't talk about the Corps of Engineers, but we have the Corps here if you have some questions specifically about New Orleans. In fact, I think Mike has been in New Orleans doing some work down there, but everybody is well aware that we had extreme rainfall and wave

action into the city. Levies broke. Many folks unfortunately were killed. There was extreme damage.

The Corps is working very hard to get that infrastructure restored in preparation for the next hurricane season that's upon us in just a few more weeks. So that's one of the catastrophes -- infrastructure catastrophes that we have seen in the last year.

Another one that you might not be so familiar with is the dam failure that happened in Hawaii this past spring. The Island of Kauai was looking at a couple of days of rainfall. They had seen two to eight inches of rainfall on the island. In some places they had high spots up to 17 inches, and they experienced a dam failure.

This was a 40-foot high dam. It was privately owned and it was used primarily for irrigation of sugar cane fields. It was built the 1890s and there were no records that this dam had been routinely inspected and maintained by the dam owner.

Five people were killed as a result of this dam failure. Homes were swept off their foundation. And, in fact, the main highway on Kauai was impassable for quite a while. It was washed out

as a result of this dam failure.

Then a third one that has come to our attention recently in March. We have a pump storage project owned by AmerenUE, independently owned utility, very similar to our Raccoon Mountain pump storage project.

What happened here, we had the -- it's an earthen reservoir. This is the top reservoir at Taum Sauk. They were pumping an unstaffed plant. They were pumping water back up to the reservoir at night and they pumped and they pumped unknowing that the gauge at the top -- in the top reservoir wasn't working correctly. They overpumped the reservoir -- the water over top the reservoir and the dam failed.

This is a picture of that dam failure. Fortunately, it was in December. There's a campground downstream. There could have been 300 folks in the campground. As it was, the ranger and his family were the only folks that were there. Three of his children were injured as a result of this dam failure.

Every time something like this happens, we get a call. The question is: Can that happen here? What's our situation in the Tennessee Valley?

I can tell you very clearly that the kind of rainfall that we see here can happen here. We have hurricanes that come up through the Valley. Those kinds of antecedent situations very much can happen here.

What we're going to do today is talk to you about how we maintain our infrastructure, how we inspect and test our infrastructure, how we do long-term improvements to our infrastructure so that the consequences are not what you have seen in these three incidents in the past.

What I want to -- I would love to have the opportunity to take you out and do an

on-the-ground tour of all of TVA's infrastructure. The infrastructure that we're going to talk about today is the infrastructure that was in the past primarily funded either partly or wholly by appropriated dollars.

We can't go out into the field and tromp around to look at all of this infrastructure. So what I'm going to do is a slide show tour of that infrastructure to give you a feel for the amount of infrastructure and the type of infrastructure that is out there.

What I want to do is talk about things like the water barrier, the lock, the dam, the powerhouse, the gates that stop the water from flowing over this spillway or through the sluiceway.

I want to talk about our bridges. I want to talk about our aeration systems. You heard Kate mention that. I want to talk about our tailwater warning systems. I want to talk briefly about our recreation infrastructure. This is all infrastructure that TVA is responsible for, responsible for inspecting, maintaining and modifying long-term.

So let's start with the dams. I think everybody in this room has heard this part of this speech at least. We have 49 dams. 48 of those dams are in the Tennessee River watershed. One dam is in the Cumberland. We operate that as an integrated system. It's 41,000 square mile watershed.

We get about 52 inches of rainfall on the average over the year. You have seen what on average means with what Steve has talked about with rainfall and runoff.

I want to orient you. You will hear us talk over the next day and a half about the right embankment or the left abutment. The orientation that we will be using is if you're standing on the

dam with the reservoir behind you, the tailwater in front of you, right would be on your right and left would be on your left.

I want to start out with the infrastructure that makes up the water barrier. I will talk about each one of these pieces of infrastructure individually, but I wanted to give you an overview of how it all fit together before I went into the individual discussions.

The water barrier is the barrier that creates the reservoir and it's made up -- a lot of folks thinks it's just the dam, it's a lot more than just the dam, but it is definitely the dam.

If you look here, this is Watts Bar. It's typical of the main river project. Watts Bar was constructed between 1939 and 1944. If we start over at the powerhouse, we have five generating units at Watts Bar. The dam itself is 2,960 feet long and it's 112 feet high.

Coming on across the spillway, we have 20 spillway gates at Watts Bar. They are 40 feet high by 32 feet wide. I am doing this to give you an idea. A lot of folks don't understand the size. So I am going to take a little time as we do our tour, since we can't be there, to give you some dimensions

so that you can better understand the size of some of this infrastructure.

Coming on across here at Watts Bar we have a lock. It is a 60 foot by 360 foot lock and it has 70 foot lift. You also see some other infrastructure that I will talk about in a minute.

Mooring cells, both upstream and downstream, those mooring cells are there for the safe and efficient passage of the navigation barges and vessels that are coming up and down the river.

That's the main water barrier, but there's also other aspects of the water barrier that

I will discuss in some detail. There are saddle dams. When we created the reservoir many times there were low spots around the perimeter of the reservoir and we had to actually go in and build additional auxiliary dams so that the reservoir would be able to be maintained at a particular level.

We also have back-water protection stations, and I will talk more about that in detail. This is to protect flooding in some cities that were not -- that did not move.

We also have dewatering stations over in West Tennessee. These were created so that we didn't end up flooding most of West Tennessee.

So I would like to, first of all, start with our dams and talk through the types of dams we have. We have four types of dams in the Tennessee system. Essentially the category of dam that I am going to talk about really describes how we operate that particular project.

This is Guntersville Dam down in Alabama. Again, it's very similar to what you saw with Watts Bar. The main river dams are primarily concrete. They don't fluctuate a lot because they are key in maintaining the navigation channel up and downstream.

Those folks who designed this system that came long before we did, I think, were brilliant in many ways. One of those ways is the way they designed the dams on the Tennessee River and the way they designed them to back up one to the other to provide for smooth and efficient navigation.

Guntersville was modified. It was originally completed in the 1940s, and then it was modified as part of our dam safety program that you will hear some more about in the 1993-94 time frame.

What we did for this modification, we found out that it was not a -- it did not meet

hydrologic requirements. So we went over on the far side and we added a concrete wall to increase the height of that dam.

The second type of dam is our tributary multipurpose projects. They are what the name implies. You heard Steve talk about the tributary projects. They provide the -- primarily the area for flood control storage, as you heard Steve talk about. They provide the water downstream for navigation, for hydro powered production, for water quality, for water supply.

This is a picture of Hiwassee Dam. This dam is in East Tennessee. The thing that's unique about Hiwassee is it's the first dam that had a reversible pump turbine.

A lot of people think Raccoon Mountain was our first pump turbine, that's not the case. This was actually one of the first pump turbines in the United States right here at Hiwassee. It still runs today. We pump the water up when the cost of electricity is low and we release the water and generate with the water when the cost of electricity is higher.

The third type of project that we have is what we call our tributary run of river projects, power projects. These projects were acquired by TVA or built for one purpose, and that is power production. This is a picture of Appalachia Dam. Again, Steve mentioned that as part of ROS. Appalachia is unique in that the powerhouse and the dam are not in the same location. In fact, they are quite a distance apart.

What you have here is the dam. Off in the background there, you see the pipe, that's carrying the water down to the powerhouse. The

powerhouse is actually 8.3 miles downstream. Here's a picture of the powerhouse.

What we do is we carry that water down at a very high level so that we have a lot of elevation or had and can produce the power on downstream.

Although, Appalachia is a hundred percent power project, there is recreation releases and recreation opportunities provided below the power house here at Appalachia.

The last -- the next type of project is our tributary multipurpose non-power projects. We have 20 projects that fall into this category. They are multipurpose. They provide flood control. They provide recreation. They provide water supply, but they do not produce power.

This is a picture of Little Bear Creek Dam. This is a dam -- one of four dams that make up the Bear Creek Project in Northwest Alabama. You will be hearing more about Bear Creek tomorrow.

The thing that's interesting about Little Bear Creek is you see the intake in the reservoir there. The valves that allows the water to pass into that intake and through the dam is remotely controlled from here on the tenth floor in the River Forecast Center.

TVA didn't build all of their dams. TVA acquired seven dams. Six of those dams were purchased in 1939 and then Wilbur was purchased in 1945. These were purchased from private power companies.

The reason we purchased Wilbur later is because we were purchasing it from a different utility. We purchased Wilbur from the East Tennessee Light & Power Company.

The one that's interesting here -- they're all interesting, of course, but the one

that's most interesting here is Hales Bar. You don't hear us talk about Hales Bar because Hales Bar isn't there. Hales Bar was constructed from 1905 to 1916.

We realized that we had some issues

with leakage at Hales Bar. We tried to remedy that leakage in the 1946 to 1952 time frame. We realized that we were not going to be successful, that we had serious problems there at Hales Bar. So in the 1960s Hales Bar was removed and replaced by the Nickajack project.

A lot of people think all dams are concrete. In the Tennessee Valley that's not true. We do have 14 concrete dams. In this slide you see Norris Dam, a good example of a concrete dam. Our dams, with the exception of one, are all gravity -- concrete gravity type dams.

We have 12 dams that are a combination of concrete and earthen embankment dams. This is Chickamauga Dam. Chickamauga Dam is, as I know everybody in the room has heard this one too, is the last line of defense for flood protection for the City of Chattanooga.

So what that means is Chickamauga, with all of those projects upstream, is providing over $5 billion of benefit in flood protection to Chattanooga and the cities downstream.

We have 21 earthen dams. I will show you some examples of those earthen dams. These earthen dams are similar to the earthen dams that you

saw that failed in -- on Kauai.

South Holston Dam is an earthen dam. The dam itself is in Tennessee, but the reservoir extends into Virginia. This dam was constructed in the time frame of 1942 to 1943, and it's the second tallest embankment dam in the Tennessee system. It has one hydro electric unit.

And the thing that's interesting, you can't see it, but I will show you a picture in a minute, but over on the left side of this dam is a morning glory spillway, an ungated morning glory spillway that I will show you. A mile and a half from this dam is ungated chute spillway. So many times folks look at the dam and they think they are looking at the entire water barrier.

In this particular case, rather than constructing a saddle dam over on one of the low places, we realized we needed more ability to release the water through the spillway. So we constructed that spillway a mile and a half away from the dam.

We also have one wooden dam. It's a rock filled timber crib dam, Ocoee No. 2. This was probably one of the very first hydrolyzed hydro electric projects in the area. It's very critical to whitewater rafting in the area and the economy of

that area.

As we were looking at the dam and assessing the structural and the hydrologic integrity of that dam, we did decide to put a concrete face on the downstream side of this particular dam.

What I want to point out here, on the left side you see the beginning of the flume. We have a 4.7-mile flume, a wooden structure that carries the water from Ocoee 2, very similar to what I mentioned at Appalachia, carries it downstream to the powerhouse and then that water falls 250 feet from the flume down to the powerhouse to generate electricity.

For those of you that have rafted below Ocoee 2, you will recognize the powerhouse, you raft right by it. There used to be a bridge there that was a little tricky to navigate around, it's gone now, you do raft past the powerhouse and the take-out areas on down stream of the powerhouse.

So now I am just going to -- to give you a little bit more of a picture of our dams, I'm going to show you some key fun facts about some of our dams.

Our oldest dam in TVA is Ocoee 1. It was constructed in 1911. We acquired it in 1939 and

you -- I mentioned before our concrete dams were gravity dams, this is the one exception. You will see here on the right there's a small arch section in this dam, that's, again, unique to the Tennessee Valley.

In this dam also we have what we call wooden flash boards we put above the spillway, and what those -- they are there to help us increase the head, increase the elevation of the reservoir so we can generate more electricity, but they are also designed to blow out in a flood event. We want those to blow out and we will collect them on downstream so that we don't damage the project. We get the additional hydropower generation, but we don't impact the dam's ability for flood control. We end up with a flood event there at the Ocoee 1 and collecting our flash boards downstream about every two to three years.

Our first dam, at least the first dam that TVA built, is Norris Dam. It was completed in 1936. This was actually designed by the Bureau of Reclamation and named after Senator Norris. One thing that's unique about Norris, it was the first one that was built by TVA.

TVA also went in and created the town

of Norris so that the workers would have someplace to live. This was one of the very first planned communities. It became a model for planned community development elsewhere. TVA eventually, in 1948, sold the town of Norris to the private sector, but for that amount of time it was a town that was owned by

TVA.

Our newest dam, who could forget, Tellico. It was built by TVA in 1979. There's a canal that connects Tellico to Fort Loudoun, the Tellico Reservoir to the Fort Loudoun Reservoir. So what that means is the water that is in the Tellico Reservoir can pass through the canal and generate power to the four units at Fort Loudon.

Tellico is interesting. I will talk a little bit more about saddle dams. When we constructed Tellico in 1979, we constructed it with a saddle dam in this location. This is a 2,000 foot -- it was a 2,000 foot long saddle dam.

What we realized when we went back in to address and look at the structural and hydrologic integrity of the dam is that we needed more spillway at the combination of Fort Loudoun and Tellico. So we changed this saddle dam, and today what you have here is an ungated emergency spillway.

If you're driving down the parkway there, you go past Tellico on your left. If you go a little bit further you look out in the field and you can see it there. There's a lot of recreation activities. People are hiking and walking and observing wildlife in this area. Many folks don't realize this is part of the water barrier for Tellico and Fort Loudoun.

Our longest dam is Kentucky Dam. It's 8,422 feet long. A lot of folks don't realize that Kentucky Dam, when it was built, Kate mentioned the way appropriations were made, the way that the projects were segmented as to what benefit they would provide, Kentucky Dam was built to provide flood protection downstream on the lower Ohio and the Mississippi River.

So as we operate the integrated system and we look on downstream, we have a responsibility

not only to flood risk reduction in the Valley but to flood risk reduction on the lower Ohio and the Mississippi.

We have more spillway capacity here than anyplace else. We actually can pass 558,000 CFS through the spillways at Kentucky.

Our shortest TVA dam is Wilbur Dam.

It is 375 feet long and it was completed in 1912. This was one of those dams that TVA acquired, and we acquired it in 1945. We do have some power generation here, some water supply and some recreation benefits.

Our highest TVA dam is Fontana. It's 480 feet high. It was built on a very accelerated schedule. This was during the war and there was a real interest in getting power available for Alcoa. So this dam was built on a very accelerated schedule. The Appalachian Trail goes across the top of Fontana Dam. This dam is actually the tallest dam east of the Rocky Mountains.

I want you to take note over here that on the left side of the dam is the spillway. I am going to show you -- show you the spillway in a little while, but I want you to see the spillway, it's there in the trees, between Fontana is very unique in the way we spill and sluice water.

Our shortest dam is Lost Creek. It's only 18 feet high. This dam is part of eight projects in the beach water rivershed. These projects were built for flood control, recreation and water supply. This project was completed in 1963.

Now I want to move on to the water

control gates, a very critical part of the dam barrier. There's three ways to get water through the dam. We can get water through the dam through the turbines, and that's when the powerhouse intake gates

become important. We have 125 powerhouse intake gates.

We also can move water through the spillways. We have 442 spillway gates. We can move water through the sluice gates. We have 67 sluice gates.

The way we decide how we're going to move water, obviously if we're going to generate we will move water through the intake -- the turbine intake gates, but otherwise, how do you make the decision of whether you're going to release water over the spillway or through the sluiceway.

The spillways are at the top of the dam. Sometimes we don't have the water high enough to be able to use the spillways. Sluiceways are at the bottom of the dam, that's where your cold water is.

So when we release water through the sluiceways, we're depleting our cold water inventory. You heard Steve talk about the cold water, that's critical. So we will make decisions as to how we release water taking all of these things into consideration.

There have been times at Norris where we have allowed that reservoir to fill up and have not released the water through the sluiceways because we didn't want to lose that cold water. We would fill the reservoir up and let the water go through the spillway so that the warmer water went downstream and we had that colder water available to us for the summertime when it gets so hot.

Here's an example of Chickamauga spilling. There are 19 gates at Chickamauga. As you can see here, they are all open here, and these gates are 40 feet wide and 40 feet tall.

Our smallest gates across the system are at Chatuge and Nottely. Those gates are 5 feet

by 6 feet. Our largest spillway gate is at Tims Ford. Those gates are 42 feet by 40 feet. So you see the gates are very different sizes, depending on all of the criteria that went into the design of the dam.

Here at Chickamauga we will spill anywhere from 50 to 100 days a year. That's because Chickamauga is a bottle neck and many times -- I was talking to Austin at the break. Many times we need

to move water past Chickamauga and we will spill it at Chickamauga to get the water on downstream because it can be much more valuable on downstream to meet the multipurpose benefits, including hydro power production.

Nickajack spills most frequently. It spills over 100 days a year. Kentucky, it's not unusual that we spill at Kentucky two to three months during the course of the year. So we do use those spillway gates, but we use them very prudently and very knowingly as we move water through the system.

I mentioned Fontana and the spillway gates there on the left side of the dam. The way Fontana works is we have the spillway gates at the top of the dam. We also have the sluiceway, they both discharge into the same tunnel, and that water then comes through the tunnel and is released below the dam.

There's a lot of energy in that water and we have to dissipate that energy. It's very interesting, a lot of folks will call and say, when are you going to be spilling over Fontana, or if we're in a flood event, are you spilling over at Fontana, because we have flip buckets at the bottom there and what we do is we want to dissipate that

energy so that we don't have a lot of erosion downstream. That water will hit those flip buckets, go up almost 100 feet into the air, that energy will

be dissipated and the water then falls back down. This happens on average about every two to three years.

At South Holston I mentioned we had a Morning Glory spillway. This is a picture of that Morning Glory spillway. It has never been used, but it is there to release the water downstream in the event that we get that really large rain and we have got to move the water past South Holston.

I mentioned sluicing. That's from the bottom of the dam. This is at Norris. These slots that you see there are 5'8 by 10 feet. Norris is critical, as I mentioned, to the cold water inventory.

When we're releasing water through the sluiceways at Norris, this is cold water going downstream, cold water going downstream for aquatic habitat, for cooling at the nuclear and the fossil plants, the water quality, all of those things go into consideration as we decide how to release water from Norris.

Moving on to some other aspects of the

water barrier. You may not be aware, but TVA also operates and maintains four backwater protection areas. We had four communities in the Valley; Guntersville; Alabama; Kingston, Tennessee; Dandridge, Tennessee; and Big Sandy, Kentucky, these -- when we ended up building the dam and filling the dam. These four towns would have been inundated. So what TVA did was go in and build a system of levies and pump stations to protect these cities.

These pumps work constantly. They are on a continuous cycle. What you're doing is the water that comes from the community, from the city to the levy pumps then out into the reservoir. The levies protect the cities from the reservoir. They

also direct the water on into -- with the pumps into the reservoir in daily mode, as well as during flood events.

I mentioned saddle dams. These are critical to the water barrier. They are, as I mentioned, around the perimeter of the reservoir. Many times you have low spots or saddle spots. As we decided how high we were going to build the dam and how high we were going to pond the reservoir, we found those low spots needs to have auxiliary dams

built to create the water barrier.

This is the saddle dam at Douglas. It's 1,918 feet long and 101 tall. That's awfully large for an auxiliary dam, as compared to Douglas itself, which is 1,705 feet long and 202 feet tall. So these saddle dams are very critical to the water barrier. We actually have ten saddle dams around Douglas, in addition to the main dam at Douglas.

We also operate and maintain dewatering pump stations. Over at Kentucky and Wheeler, when we built those projects, it's a very flat area. If we had just created a reservoir, it would have gone on and on forever.

So what we decided to do was create levies and pump stations for a little bit of a different reason but if -- that water, it would have been very shallow and it would have gone on forever, and we would have issues with Malaria back in the 1930s and the 1940s. We would have had a tremendous numbers of roads and bridges and utility lines that would have had to be relocated. There would have been a lot of hardwood forest that would have been flooded.

So what TVA decided to do when they built Kentucky was to go in and put in this system of

levies and pump stations. Unlike the backwater protection, these are only operated on a case-by-case

basis when it's necessary. What they do today is protect the farm lands and provide some wildlife habitat. They are operated manually. Someone from TVA has to go out and operate these pump stations when it is necessary to operate them.

That takes care essentially the water barrier, with the exception of a lock, and I will talk about the lock as part of the navigation infrastructure.

We have a wonderful partnership with the Corps of Engineers when it comes to navigation and the navigation infrastructure. TVA owns the locks, and as the asset owner we are responsible for the water barrier aspects of those locks.

As TVA dam safety officer, I work very closely with the Corps of Engineers as we operate -- as they operate, maintain and improve those locks. The Corps of Engineers operates the locks for us. They also are -- do the maintenance dredging in the channel. We share responsibilities for maintenance of the locks.

As it stands right now, we have two projects -- major projects going at the lock,

Chickamauga lock and Kentucky lock, we're working very closely with the Corps. The Corps has secured appropriations for construction of both of those locks, and we are providing assistance and work very closely as we move forward through the design and the construction of both of those new locks.

The infrastructure, we have locks at ten dams. That's 14 locks. What you will notice there is when the system was originally designed, the idea was to have a main lock and an auxiliary lock at each one of our dams. You can see that happened at Guntersville and on downstream at Wheeler and at Wilson and at Pickwick.

It didn't happen at Kentucky, but

because of the canal that connects Kentucky and Barkley, Barkley does serve as an auxiliary, or from the Corps' perspective, Kentucky serves as an auxiliary. Those two compliment each other and provide for navigation on the lower end of the Cumberland and the Tennessee River.

You can see the lock sizes vary greatly. When you move upstream of Chattanooga, you see we have 60 by 360 foot locks. Our largest lock is at Pickwick. It's 110 feet by 1000 feet. I have got one slide here just to remind you that size is very important.

The smaller locks upstream of Chattanooga, if you have a nine-barge tow, you have to break that tow up and you have to put each one of those barges through one at a time. Those lockages are generally an hour in length. So you have much longer lockages, unlike on downstream where you have bigger locks and you can lock the entire tow through.

The navigation infrastructure is not just limited to the locks. I mentioned earlier the mooring cells. We have mooring cells, 51 mooring cells, and these are placed up and downstream of key areas, particularly at the locks, so that we can have very efficient and very safe passage of the barges through the locks.

We also have ten operation buildings and workshops at the projects. The operations building is where the Corps lives, I guess, and operates the locks, and the workshop we share where we can bring things in and store our equipment and do maintenance on our equipment at the workshop.

The Coast Guard is responsible for marking the commercial navigation channel, the 800 miles of the commercial navigation channel. TVA is responsible for marking 375 feet, I'm sorry, miles, miles, of the secondary channel. What that

means is we go in and we install buoys, dayboards, daymarkers, fingerboards, and I will talk about each one of these things, to actually mark the channels for safe transport up and down not only the main river but also those recreational channels.

These are buoys. Those of you that are sailors remember right as you return from the sea. This shows you some of the buoys. They mark the outside edges of the channels. We also have navigation lights, again red and green, to mark the channel in the night.

The fingerboards help us mark areas where we can't put buoys that might be too shallow to be able to go in and install a buoy. Then we also mark hazards. There might be a low area, a sand bar, a submerged lock, something that would create a boating hazard. These are all maintained by TVA.

As you're on the river you may notice -- as you go under the bridges you will see a staff gauge painted on a bridge pier. Those are critical. Tom can tell you, those are critical to folks moving on the river, and it's up to TVA to make sure that those are legible and they are correct for use by the folks navigating on the river.

We also have 1,626 buoy reference ranges. Buoys very often get off of target and folks hit the buoys. We have high water and the buoys move, but they are very important in navigation, particularly in areas where we have dredged because the bottom doesn't necessarily look like what the surface features look like. So those buoys are very critical.

We don't want to have to go in and resurvey every time we have a concern that a buoy is off of station. So what we do is we have these reference ranges on land so that we can go out and

very quickly and visually locate where that buoy is supposed to be and return it to where it needs to be to ensure safe navigation. Again, that's a TVA responsibility on those secondary channels.

We do have a service boat. It moves up and downstream twice. It covers the entire length twice a year. It's just going out and operating or maintaining, cutting back brush so that you can see some of these markers, doing repairs, whatever it takes to keep these navigation aids working and available to the public.

Bridges, another critical piece of infrastructure. TVA maintains 92 bridges. We have

an agreement with the Federal Highway Administration, and what we are responsible for is going in and inspecting and maintaining those bridges according to the national bridge inspection standards. This is extremely important. Most of these bridges we own because they provide access to some of the other infrastructure that I am describing.

It's interesting, two of these bridges are actually a part of the Appalachian Trail, the bridge at Watauga, and I have already mentioned the bridge at Fontana.

We have 43 roadway bridges. Some of them were built as a part of the project. Some of them sit right on top of the dam. They are an integral part of the dam. Some of them are above the dam, and they become a water barrier issue if they are above the dam, because in the event of a bridge failure they would fall into the top of the dam into the spillway gates, and that could impact our ability to operate those spillway gates and impact the ultimate safety of the water barrier.

We have 41 foot bridges. Nine of those foot bridges are on the Muscle Shoals reservation. Some of them are a piece of our

recreation areas. Some of them provide access to our intake structures.

We have seven lock and services bridges. What this is, these are bridges that go across our locks to provide access for the Corps of Engineers.

We also have one railroad bridge, this is at the Yellow Creek Port, and we own the land there at the Yellow Creek Port and we currently own that railroad bridge as part of the infrastructure.

Kate mentioned the aeration systems, another critical part of our infrastructure. We use the aeration systems to boost the amount of dissolved oxygen in the water that is released through the generators of the dams. This is very critical. It has helped us improve conditions in over 300 miles of tailwater river downstream from our dams.

We did a lot of work in the early 1990s as a result of the lake improvement plan. And as Kate said, we have now come back as a result of the ROS and are doing some more work on our aeration systems. We have a variety of different ways to aerate the water, depending on the situation at the particular project and the particulars of the reservoir. We use all of the options available to us to address the dissolved oxygen.

Tailwater warning systems, another critical part of the infrastructure. In the past most of our warnings in the tailwaters were signs. I'm sure if you recreate on the rivers you have seen, "Dangerous Waters, Don't Approach," but what we have started moving in the direction of now is to install both audible and visual tailwater warning systems.

So anytime we're going to release water downstream of the dam, either through the spillways or through the turbines, we have the

tailwater warning systems. They are actually wired such that the generators cannot come on if the tailwater warning system has not sounded.

We currently have tailwater warning systems installed at ten of our plants, and by the end of fiscal year '08 we will have added 14 more tailwater warning systems to our infrastructure.

Rain and stream gauges, more infrastructure that's very critical to us. These help us make water management decisions, help us make decisions on how much water to hold in the reservoir, how much water to let downstream, do you let it through the generators, do you pass it through the sluiceway or the spillway. We share this data. It's available to the public on the web site, and we share

it with all the state and federal agencies.

I'm not going to go into recreation infrastructure in much detail because you-all have had sessions on recreation, but we do have a lot of recreation, both in our recreation facilities and our natural resource areas. We have toilets. We have parking areas. We have roadways, picnic facilities, pavilions, campgrounds, a provision of electric services is water service. All of this infrastructure is a part of the infrastructure that TVA is responsible for maintaining long-term.

So that concludes our slide tour of TVA's infrastructure. I would be more than happy to take anybody out to view any aspects of this infrastructure in the field, but for now we will have just to make do with the slide show. And if there's time, I will be glad to answer any questions.

CHAIRMAN BRUCE SHUPP: Questions?

Austin.

MR. AUSTIN CARROLL: Did you say -- does TVA maintain those bridges?

MS. JANET HERRIN: Yes.

MR. AUSTIN CARROLL: Owns them and maintains them?

MS. JANET HERRIN: Yes, according to

standards that the Federal Highway Administration has in place.

MR. AUSTIN CARROLL: One other question. On the -- you talked about the pump storage, was that Hiwassee?

MS. JANET HERRIN: Yeah. The pumper, we have one unit that is -- that can pump as well as generate at Hiwassee, that's the second unit at Hiwassee.

MR. AUSTIN CARROLL: Where is it pumping to?

MS. JANET HERRIN: Back up into the reservoir. The water comes through -- at night when the electricity is cheaper, we will reverse that turbine and it will pump the water back up into the reservoir. Then during the day when electricity is more valuable, we use that same water and put it through the turbine in a forward direction and we will generate electricity, very much like Raccoon Mountain. The difference with Raccoon Mountain is we had to create the upstream reservoir. As Hiwassee it was there for us.

MR. AUSTIN CARROLL: Okay. I just hadn't picked up on that.

CHAIRMAN BRUCE SHUPP: Any other

questions?

Thank you, Janet.

MS. JANET HERRIN: Thank you.

CHAIRMAN BRUCE SHUPP: The next speaker is Jerry Gibson, who is the manager of Dam Operations, is that correct, Jerry?

MR. JERRY GIBSON: Manager of dam safety and engineering.

CHAIRMAN BRUCE SHUPP: All right. I

looked at the wrong line in my scribbled notes.

MR. AUSTIN CARROLL: One more thing before we get started.

CHAIRMAN BRUCE SHUPP: Austin, go ahead.

MR. AUSTIN CARROLL: You know, looking at all of that, I didn't -- you know, I didn't -- you know, I have been around a long time, somewhere before dirt, but, you know, I don't see how TVA does it on the budget you do.

You know, what is it, about -- what was that, about 90 million or something?

I mean, I didn't realize that you had all of those bridges and all of that stuff, I mean, I don't see how you do it on that. On the money you're spending, you do a good job.

DR. KATE JACKSON: Thank you.

CHAIRMAN BRUCE SHUPP: Jerry, the floor is yours.

MR. JERRY GIBSON: I'm in a difficult position and a good position, I think. It's difficult because I follow Janet and Janet does an excellent job in speaking, so that makes it tough for me, but a good position because after me you have a lunch break. So you can look forward to that.

Okay. So I am going to describe the stewardship activities that we perform, in particular that we perform on our water barrier, on our navigation system and on our bridges.

I am going to try to use the mouse and the pointer on the screen. So if you can reference that, I want to use that to point to some of the structures and some of the features as I go along.

This is why taking care of our infrastructure is so important. This is what happens to chains in a wet environment. This chain is at

Fontana. Fontana was built in 1944. It's a chain that supports one of our spillway gates, but it's under water most of the time.

The chains, of course, are made of steel. Water with steel equals corrosion, rust, and

sometimes breakage. When the chains break or when there's damage, it takes a lot of work, a lot of time, a lot of money to make the repairs and do the fix.

Stewardship is a process of trying to prevent this from happening. It's a process of inspections, assessing the condition, performing maintenance and implementing projects to prevent things like this from happening. Just like in your home, you do the same type of activities in your home, sometimes, as you see, things do happen.

I want to describe an event that happened in January of 2005. It happened at Hiwassee Dam. Hiwassee is located -- Janet showed a picture of Hiwassee earlier. It's actually located close to Murphy, North Carolina. If you have never been there, you should go. It's an absolutely beautiful area.

One way to get there, which is the way I like to go, is across Highway 68 through Sweetwater, Madisonville, Tellico Plains, it's a beautiful drive, especially early in the morning at sunrise, I would definitely recommend you take that trip one day.

Hiwassee was built and made

operational in 1940. As Janet said, it has two generating units. This is unit one, if you will look at the screen that I am pointing to with the pointer, and this is unit two. Unit two is the pump storage unit that Janet described. It was placed in operation in 1956.

The overall hydro dam is 307 feet tall. I want to point out a couple of other features about the Hiwassee Dam. This is a cross section of the dam. It's looking at the side, a cutaway view of the dam.

On the right side is the lake level or the reservoir level. As we look at the pointer, this is the face of the dam on the lakeside. On the left side is the downstream side of the dam or the river level of the dam. This is the generating unit. Of course, the generator is in this area and this is the turbine in this area.

Around the turbine is the scroll case, and the only reason I am pointing that out now is later in the presentation I am going to show a picture of a scroll case at Douglas. The scroll case is an area that's around the turbine that water actually runs through before it gets to the turbine.

In this area, this is the penstock or

it's a large pipe. At Hiwassee, this is an 18 foot diameter pipe. So it's quite large. It extends from the upper reservoir down to the unit. The water will flow through the penstock or through the pipe into the scroll case and then through the turbine and then down into the river to generate electricity. So that's basically how that works.

On the face of the dam, I want to point out a couple of structures first. As you see what I'm pointing to, this is a trash rack. The trash rack prevents logs, trees, other large items from entering into the penstock and going down into unit, which damages the generating unit.

In between the face of the dam and the trash rack is an intake gate. Janet illustrated or actually showed some pictures of some of our intake gates. This intake gate is showing the dam closed locking the penstock. When it's in this position, it

prevents the flow of water into the penstock and into the unit. When it's in this position, we perform maintenance and repairs on the unit.

When the intake gauge is up, it will be in this area so that water can flow into the unit and generate electricity.

The gate is normally supported by

chains, and this is quite large chains. I will show you. I have a couple of items to show here, and I will show you a piece of the chain in just a few minutes. So that's the components of the dam.

So on January the 8th, 2005, we tried to start unit one at Hiwassee and the unit would not start. We have plant forces at Hiwassee and they examined the unit and determined that the intake gate had actually fallen. It had fallen down into a position to block the flow of water into the penstock.

This gate is quite large, as you can imagine. It weighs 55 tons. Okay. It's 3 feet deep, 29 feet tall and 19 feet wide. So it would be about the size of the opening of the brown wood on the wall there, that's how large it would be if it was sitting on its side. So it is quite large.

It operates similar to your garage door. It has, you know, chains on both sides and a mechanism, a hoist that raises it and lowers it, similar to how your garage door operates.

Well, what happened recently is the gate fell and one of the chains broke. I will step over here and get the chain, a piece of it. This is actually -- let me go back over here. This is

actually part of a link of the chain. So you see how large it is. Just this link is actually pretty heavy.

This is a piece that we used to perform some testing on, but the overall length of

the chain is 317 feet long and the chain weighs 1,550 pounds. So it's -- like Janet had said earlier, this is a massive piece of equipment, the gates are very large, and the chain, of course, is quite substantial.

Typically the chains are replaced every 30 years, and this chain was scheduled for replacement in 2005. This is the damaged gate that's being removed from the water. We did have a spare gate available and spare chains and the -- they were put in service and the unit was, you know, returned to service.

So why did the chains fail?

We did -- we put a team in place to evaluate why the chains failed. We did a cause analysis to find out what happened and why.

The team concluded that eight months earlier the gates had been operated and during that operation the chain was damaged. Then it took eight months for the chain to eventually fail and for the

gate to fall.

Despite all that we do, and I will go through all of our stewardship activities, things like this do happen. What we try to do is we try to have the teams to determine what happened, why it happened, and we use the lessons learned to try to improve on our processes and our inspections and other criteria.

Stewardship is a continuous process. It's a continuous process of inspections, accessing the condition, performing maintenance, implementing projects.

Inspections, we ask, did the structure meet the inspection criteria? Does it function properly?

While we perform the inspections, we access the condition of the structure or the

equipment and we try to determine if modification is required or does it need replacement.

We perform maintenance activities on all of our components. We have preventative and corrective maintenance activities. A preventative maintenance activity, for example, would be a changing the oil in your car. A corrective maintenance activity, for example, would be repairing

a flat tire. We perform maintenance activities on all of our equipment.

We implement projects. When improvements need to be made to a component or to a structure or when the condition warrants replacement. It may cost more to maintain the equipment than it does to replace it or to put a new piece of equipment in place.

The stewardship, it's a continuous cycle, like I said, a continuous cycle of the inspections, assessments, maintenance, and implementing projects.

I want to go through some of our infrastructure and how we do maintain them, how we do perform stewardship activities. I want to first discuss the water barrier.

As Janet had discussed earlier, she talked about our dams and described the assets there, described the water control gates, I am not going into that and redefining what those are. She also described the backwater protection and dewatering stations, but I will go into detail on how we do inspect and maintain this equipment.

First for our dams, in Janet's presentation you saw several failures of dams. This

is the Teton Dam failure that occurred in 1976 in Idaho. This is an earthen dam. This is the side of the dam that failed. As you can see, the water flowing through the dam and leaving the reservoir.

This is why TVA has a dam safety program, to prevent things like this from happening.

As a result of the Teton Dam failure, federal guidelines for dam safety were established in 1979, and they were developed by a team that TVA was a part of. Federal guidelines became law in 1996, and they were revised in 2002 after the events from September 11th.

A couple of items to point out on the federal guidelines. First, they establish criteria to ensure that dams can safely pass probable maximum flood and that they can withstand a maximum credible earthquake. These are really big events. These are very large events, a probable maximum flood and a maximum credible earthquake.

The federal guidelines also established criteria for hazard classification for dams as either low, medium or high hazard dams. 83 percent of TVA's dams are classified as high hazard, and this is based on height of the dam, impoundment volume, and downstream development. I

wanted to point out that it's not based on condition of the dam. Okay. It is not based on the quality or the condition of the dam. It is based on -- in TVA's case and in most instances, downstream development of the areas below the dam.

TVA's dam safety program has five major components. They are modifications that were made to the dams, inspections, instrumentation inspections, maintenance is performed, and emergency preparedness.

First I want to talk about the modifications. All 49 dams -- all of our 49 dams have been evaluated for probable maximum floods and maximum credible earthquakes. No modifications were required for 26 of our dams and 21 of our dams did require modifications and these have been completed.

And they required modifications because at the time they were built the criteria was different. Most of the modifications involved raising the height of the dam. If it was an earthen dam, by increasing the height, by adding earth on top, or by adding a concrete wall along the top of the concrete dam, and that's to increase the storage capacity of water behind the dam.

Two modifications are still under review. One is for Chickamauga and one is for Bear Creek. Gary Brock will talk about Chickamauga more in his presentation later, but the Chickamauga lock is being designed at this time. The design of the lock and the design of the modifications required the probable maximum flood all relate, and that's being worked on at this time.

Bear Creek modifications were also under review, and that's due to the condition of Bear Creek Dam. We're having some problems with Bear Creek. Tomorrow Warren Behlau, who is the project manager for evaluating the options of what we're going to do, he will discuss Bear Creek in more detail.

I wanted to look at a few of the modifications and go over a few of the modifications that we made to some of our dams. At Nickajack Dam, this is one that Janet mentioned earlier. She also mentioned it was built because Hales Bar was torn down. Well, two of the generating units -- I guess the two generating units that were at Hales Bar were moved to Nickajack. So they are installed in the powerhouse there.

So pointing out some of the features of the dam. This is the powerhouse, if you can see the pointer on the screen, at Nickajack and the dam. The lock is located in this area. There's an earthen

embankment in this area of the dam.

During a probable maximum flood we had problems with this earthen embankment. The water, during a flood, would overtop this embankment which would jeopardize the integrity of the embankment. Considering it is earth, it would wash away the bank.

Again, if you look at the picture and my pointer, there's a white wall that extends along the length of the embankment in this area. This is the top of the concrete dam that was added to strengthen the embankment area. Now, this modification was completed in 1992.

Another modification for probable maximum flood was made at Blue Ridge Dam. This is another beautiful area. Of course, I am very biased with the locations of our dams, I think they are all beautiful areas, but if you ever have a chance to go to Blue Ridge, it's another place you should go visit.

Pointing out some features of the dam. This is the earthen dam at Blue Ridge. There's a road that goes over the top of the dam. The powerhouse is in this area. This is the spillway,

the existing spillway, and this was a new overflow spillway that was added.

During a probable maximum flood, the flood would over top the earthen embankment. The modifications that were made was a 7-foot high concrete wall, and you can see the white wall, the start of it is here in this area, it was added with a 1,000 foot crest all along the top of the dam.

In addition, the spillway capacity was increased of the existing spillway. The dark area on the spillway is the existing spillway. The lighter color area is the new concrete to the spillway that was added or expanded. And as I said before, this is

the overflow spillway that was added during this time.

The increased spillway capacity was added so that during a probable maximum flood the water could pass through the spillways and can go downstream rather than over the top of the dam and jeopardizing the integrity of the dam. This modification was completed in 1995.

Beech Dam is located in West Tennessee, and it is an earthen dam that was put into service in 1962. This is the dam in this area. There's a road that extends across the dam and down

below in this area. I am pointing to the spillway along the bottom of the dam in the slide.

The purpose of Beech Dam was flood control, water supply, and recreation. It is not a power generation dam. During an earthquake Beech Dam had liquefaction problems in this area, which is the bottom area of the -- the very bottom area of the dam.

During a significant earthquake, liquefaction is the process where the earth shakes and basically changes to quicksand. When it changes the quicksand, it loses its support structure.

So in this area during a significant earthquake, the dirt would change to quicksand, the support would be lost for the dam, which would, as you see, jeopardize the dam, the strength of the dam, and cause the dam to fail.

The modification that was made was to add earth, 14 feet of earth in this area to build that area up to provide more bulk and more strength in that area. This modification was made in 1989.

The second component of our dam safety program is instrumentation. For instrumentation we want to monitor dam performance and investigate specific problems that we're having.

For dam performance we will be asked, is the dam performing as intended as a water barrier. We monitor dam performance and track problems with the dam by collecting data and evaluating the data. We collect a lot of data and a lot of data is evaluated.

The specific data that we collect includes settlement, uplift, groundwater levels, crack openings, and concrete growth. Settlement helps us determine if a dam is settling or if it's staying where it is.

Uplift tells us -- gives us an indication of the pressures that are being pushed up on the dam. Similar if you have a swimming pool, you know, there's pressures on the bottom of the swimming pool, the same with the dam. We measure the pressures that are being pushed up on the bottom of the dam.

We measure groundwater levels, especially below earthen dams, to determine if the groundwater level is staying the same or if it's increasing. If the groundwater level is increasing, it could be an indication that there's a problem with the dam and more water is flowing through than it should.

For concrete dams we measure -- we monitor crack openings. We monitor them with instruments to indicate that they are changing, if there are any trends or if they're staying the same.

We also have a significant amount of instrumentation at four of our dams to measure concrete growth. Gary Brock is going to talk about that in great detail in his presentation. Concrete growth is a process that for some specific types of concrete they continue to grow and they continue to expand and they continue to move. And as you can tell from gates that move, from generating equipment,

it has a large impact on this equipment.

The data that we collect is evaluated on a real-time basis. It's evaluated by professionals that we have, a group of professionals in dam safety, that review all the data, that track it, that monitor trends of the data.

If location of some of the instrumentation is shown on this slide, and this is, again, a picture of Hiwassee. I use Hiwassee a lot. I guess I'm -- I must be partial to it. There's settlement markers on top of the dam at Hiwassee and they're all along the top of the dam. Again, they indicate if the dam is settling or if it is staying

the same.

Uplift instrumentation or pressure gauges are in the very bottom of the dam in the gallery.

This is the spillway section of the Hiwassee. This is the spillway gates. Between the spillway gates are the support mechanisms called piers. There are cracks in the piers of the gates and we do monitor the cracks. We do have instrumentation to measure if they are growing or changing.

Then we have concrete growth instrumentation also in the area of the dam and in the powerhouse, again, to indicate a projection of how much the concrete is growing. We do not have groundwater instrumentation at Hiwassee, but for earthen dams, of course, it would be in this area below the dam.

The third component of our dam safety program is inspection. We do perform comprehensive inspections of all of our dams every five years. In these inspections we look at everything. We look at all of the components. We look at all of the

structures.

The inspections are performed by a

group of a multi-discipline team of electrical, mechanical, and civil engineers, at least three folks that look at every part and every surface of the dam. The inspections take about a week to perform.

Two of our dams require a deep drawdown to perform the inspections. These are at Fontana and at Blue Ridge Dam. At Fontana it's required because of concrete growth problems that we're having at Fontana. We want to look at the entire surface of the dam because of the problems we're having there.

At Blue Ridge is another dam that we're having -- that we have deep drawdown inspections. That is also because of the earthen dam, we're having problems with erosion in the reservoir.

We perform these inspections by various ways and we look at various things. I want to go into now some of the mechanisms and some of the ways that we do perform our comprehensive inspections.

First on machinery inspections, as I said, we look at all of the electrical and mechanical components of the dam. We have a comprehensive inspection that's performed. Before we start we

review all of the old inspection reports and we review all the maintenance records that were done and corrective maintenance that was required before we started. All the equipment is tested and operated during the inspection. So we do make sure that it does work.

In the picture, this is a gate hoist for Ocoee No. 3. And I mentioned your garage door opener earlier for your garage door. Okay. This is similar to the opener on your garage door that's

mounted on the ceiling in your garage if you have an electric garage door. It's a mechanism that actually raises and lowers the garage door, but in this case it's the intake gate. The gate in this case is 32 foot wide by 23 feet high and weighs 40 tons. So it's a massive structure.

I'd point out also on this picture is the chain. The chain connects to the gate. Again, it's under water most of the time. So it is inspected thoroughly.

The next couple of slides illustrate some of our checklists that we use for comprehensive inspections. This is Fort Loudoun. Just a couple of things to point out on this, first, the upstream face of the dam is inspected and the downstream face of

the dam is inspected.

In addition, on the intake and the powerhouse we do inspect upstream and downstream. One thing to realize, of course, if we inspect upstream, most of it is under water.

So how do we perform the inspections under water?

Well, we perform these inspections with divers. We have divers that are experts in dam safety inspections that can dive and can examine the structures, the surface, all the components that are under water of the dam to determine their condition.

In addition, if I can get the mouse working, you can see on top of the helmet of the diver is a camera. So all of the information the diver sees is recorded so that it can be looked at later and it can be looked at in preparation for the next inspection. Now, we have the information from these prior inspections also to help us prepare for this so we will know what to look for.

Our deepest dives that we have recorded was at Fontana, and this dive was 270 feet

down and it required the use of a special suit for diver safety.

Now I want to introduce you to another component or another thing that I have here. This is

ROV. It's a remote-operated vehicle. It's very similar to a remote operated car. It has a camera on the front.

Of course, it has wheels that you see, but there's cable connections that's connected so that what the ROV sees can be recorded. Plus, it has a cable connection so it can be controlled from a remote location.

ROV is used in areas where it may be too dangerous to send an inspector or it may be used in an area where there's a cost savings for using ROV.

I am going to put this down because actually it's quite heavy, probably about 20, 30 pounds here.

And if you want to look at ROV in more detail later or talk to me about it, how it operates, I will be glad to demonstrate that either today or tomorrow, that will be fine.

The picture that you see, this is ROV. It has different wheels in this case on ROV. There's a cable that's used. This is a cable connection for the control and the video connections to ROV.

As I said, we will use ROV in a couple of situations, one where it may be unsafe to send an inspector, but also in an area where there may be cost savings from using this device.

This is an example where using ROV would be cheaper than other ways of doing the inspection. We have a pipe. We suspect there is a failure in the pipe. Rather than digging and excavating, which is very expensive, we can send ROV

in and look and see what the damage is and see what can be done.

I mentioned the Hiwassee gate earlier, the intake gate that had fallen and the chain had broke. Pieces of the chain were scattered around various parts of the lake, as you can imagine. ROV was used to help find these. This happened in January. It was cheaper and it was faster for us to use ROV to help find the components that were broken.

I wanted to point some of the -- one thing to point out is the depths that we found different components of the chain. First at a little over 57 feet we found some components, at 59 feet we found some other components, and this is of the chain supporting mechanism. This was actually mounted to the base of the dam and supported the chain at that point.

At a little over 69 feet was the first place we found a damaged piece of the chain. At 82 feet is where we saw the chain was broken. Then 94 feet down is the place where the chain connected to the gate. It's not a very good picture, but this is the chain that's laying over the side and it's supposed to be, if it was connected correctly, in the up position, you know, tight, supporting the gate.

Another method of performing comprehensive inspections is our rope access inspections. I don't know if you've noticed when you first saw this slide, but this is an inspector. If you get a chance, look at that for a second. The inspector is connected. There's three ropes that are tied off to the top.

In this case, just like the divers, the inspectors can repel and their experts in dam safety. They are experts in looking at the

components of the equipment. The inspector in this case is around 6 feet tall. I want to illustrate the size. This is the spillway gate at Tims Ford. So you can see the massive size of the component that we have to inspect.

We have tried different methods to inspect the spillway gates at various locations, from

sending cameras down, you know, like we did with ROV to find the components for Hiwassee, to using binoculars, but you can't get an up-close look at the components that way.

The best way to perform the inspections is to have an inspector go down and have a hands-on look at all the components. Sometimes in areas behind this beam, you could not see if there were damage or rust behind it. So an inspector can go in and look and see if there is damage.

We also inspect our lock gates in a similar manner. This is an inspection of the Watts Bar lock gate. The inspector is examining the support beams that support structure of the lock gate.

In addition to comprehensive inspections, we also perform intermediate inspections. We walk down the dams and sites monthly. After significant earthquake or flood events, we also perform special inspections. It doesn't matter if last week we had a comprehensive inspection, if we had a flood event, we would have a special inspection after that event.

I want to talk about these in a little more detail now. For our intermediate inspection,

this is a checklist for Fort Loudoun. We look at almost the same type of information as we do for the comprehensive inspection. An example for this one would be the surface condition. We examine the

exterior surface for changes to see if anything happened during our last inspection.

Again, to point out, the team that does these inspections are experts. They know what they are looking at. They know what it should look like and they know what changes have been made.

Monthly inspections are performed by plant forces. This is a monthly inspection checklist of some of the items that are looked at during the monthly inspections by the plant. If they see a problem, they will contact our dam safety inspectors to further evaluate the problem.

I mentioned special inspections that are performed after floods. An example of that is that during the 2003 flood we inspected the spillway at Kentucky and we inspected the spillway apron. The spillway apron is at the very bottom of the spillway gate. It's the area that the water hits actually after it goes over the spillway. We did find damage at the spillway gate. We implemented a project to make the repairs and those repairs have been made.

The fourth component of dam safety is our maintenance. This is a Chickamauga spill from May of 2003. When events like these happen, the gates have to work 24 hours a day, seven days a week. It doesn't matter when it happens, the gates have to be operational. We implement projects, and these are major projects, to repair, maintain and actually coat our spillway gates.

This project is for the Watts Bar spillway gates. The purpose of this project was to repair, maintain and coat the spillway gates at Watts Bar, and the project lasted about ten months. In the very front of the spillway you notice there are barges and there's a tug, I just wanted to illustrate the size of what we're talking about. There's a crane that's sitting on the barge in this area as you

see.

Before we start this project, we have to -- there's a lot of planning involved. You have to have all the equipment ready. Everything has to be there when you need it, because during the project the items that you need for this, you can't run to the hardware store and get. I mean, you have to have it there and you have to have them available.

We have a project that's called our

gates, guides, and seals program. This project is for our intake gates. As you recall, the intake gates are lowered to block the penstock of the pipe where water flows through the units.

Just as your garage door works, the garage door will move up and down on either side and guide to make sure it stays in alignment, that's what these guys do, the exact same thing. The gates move up and down in the guides to make sure they stay in alignment. The seals are located around the opening at the penstock. So when the intake gate is lowered, you have a water-tight barrier.

All the gates are assessed for conditions and they are prioritized, and the work is done on the intake gates, you know, based on the prioritization.

This formal program started in 2001 and it's projected for completion in 2014. In the picture, this is the bottom of the Hiwassee intake gate. Okay. You remember the gate that failed. The area -- this area was crushed when the gate fell.

This is the refurbished Hiwassee intake gate. We have a crew at TVA that actually refurbished the gate. This is the area where it was crushed. You can see it's been rebuilt. In fact,

the entire gate was refurbished and was recoated and, you know, repainted. It is now on a trailer and getting ready to be put back in service.

Another major project that we have is our coatings program. For the wet environment that we have, coating of our equipment is a key component. This formal program started in 2002 and, again, is scheduled for completion in 2014, but I have a feeling that this program is going to go on forever. I think just that part of the program is going to finish in 2014, but it will be a continuous program.

We have a joint project team that meets monthly to discuss the projects and to establish some priorities.

In this picture, this is a before-and-after picture of the Douglas scroll case. And if you remember from the earlier slides that I have showed you about Hiwassee and the cross section, the scroll case is the area around the turbine. Water runs through the penstock or the pipe into the scroll case around the turbine and then into the turbine.

This project is implemented very similar to painting an old car. All the old paint and all the old rust is stripped away and you have

paint that's applied. This is an access hatch in order to get back into the scroll case.

We have trash racks program. Trash racks are under water all the time. Again, they are to prevent wood, trees, logs from blowing into the unit. Now, this is -- this project is to rebuild the trash rack at Nickajack.

We have a program to remove all of the wood and trees in front of our dams. This shows -- illustrates the wood and trees that were removed from the front of Nickajack Dam and placed on the barge.

At Nickajack and this is -- this was in the month of June of last year, we removed 1100 cubic yards of logs and trees. A total last summer from May through September, we removed over 10,000

cubic yards of woody debris from in front of our dams. I did a rough estimate on that last night, and I think that would fill up this floor of this building, plus the first floor with just trash, wood and debris that we removed from areas in front of the dams.

We have a riprap program. It's just used to protect the areas around the dam from erosion.

The fifth component of our dam safety

program is emergency preparedness. We conduct at least two drills -- emergency preparedness drills a year. We maintain emergency operations centers in Knoxville and Chattanooga. You will see the Knoxville Emergency Operation Centers a little later today.

In fact, Jennifer Dickerson is here.

She is the manager of emergency preparedness and she will be one of the people that will give you the tour today.

The picture that you see is of the Chattanooga Emergency Operations Center. We publish emergency action plans for all dams in coordination with local emergency management agencies. Wayne Poppe is going to talk about emergency preparedness in much more detail in his presentation later today.

One other item to point out about dam safety is that we have a hydro board of consultants, and they are an independent board of internationally recognized expects in dam safety. We meet with the hydro board of consultants twice a year. They look at the problems we're having. They go to the sites and look at the problems we're having. They file a report of their opinions.

These members have a wide range of

expertise. The thing to point out about them is they

are independent from TVA. They tell us how we're doing on dam safety. In fact, last week we had a hydro review board meeting to discuss some of the things that we're talking about here today.

In addition to our dams and our gates, as Janet had mentioned, TVA is responsible for maintaining backwater protection and dewatering stations. These facilities consist of large pumps and motors that require routine scheduled maintenance. Operations of these pumps is critical during periods of heavy rain. They, again, require

24 hour a day, seven day a week operation.

The picture illustrates removing a pump from the Big Sandy Pump House. The pump is 24 inches long, 24 inches by 37 feet long. So, again, it's quite a large piece of equipment.

Some of the maintenance activities that are performed on these areas are very similar to the maintenance activities or exactly really the same as we perform on our dams. We maintain and ensure operations of the pump. We remove debris from pump station grates. We remove debris from trash racks, but this is on a smaller scale.

We maintain the spillways and maintain

the riprap and other areas that we do. We also inspects the docks and slopes for leakage, the same type of activities that we performed on our dams.

Now, let's talk about the stewardship of our navigation infrastructure. I want to remind you of the responsibilities that Janet discussed earlier in her presentation between the Corps of Engineers and TVA. The locks get the same attention at all of the other infrastructure. All the inspections are made the same.

In fact, for all the dams, for the backwater protection and the locks, we have

comprehensive inspections. We have the intermediate inspections. We have the monthly walk-downs and we have special inspections. All of those are performed on all of the infrastructure.

The division of the responsibility, TVA and the Corps, just to remind you of what Janet had said, we share the responsibilities for lock maintenance, but TVA has the dam safety responsibility for the lock and any modification or additions, but the Corps has the lead on major capital projects, like for Chickamauga and Kentucky on the new lock at those locations.

This, of course, is the Chickamauga

lock. Locks are inspected on different schedules. They have either a three-year, five-year or ten-year frequency that we will inspect the locks for comprehensive inspections.

During these inspections, the locks are dewatered. All the water is removed. Why? So that we can look at the surfaces in the dry. Most of the time a lot of the surfaces and components of the locks are under water, so we will look at it in the dry to determine their condition.

Chickamauga is inspected on a three-year frequency due to the concrete growth problems we're having at Chickamauga. And again, Gary Brock will talk about that in more detail in his presentation this afternoon.

The normal frequency for inspections is five-year frequency. Some locks are inspected on a ten-year frequency, and these are shown on the slide. These are inspected on a ten-year frequency because they are used less often than the others or because we're not having problems with these locks.

We do, however, have midway diving inspections. So every few years we will have a diving inspection to examine the surface of the

locks. The inspections on the locks are performed by

a team of TVA and Corps of Engineer folks. They are, again, electrical, mechanical and civil engineers that perform the inspection. The inspections take about a week to look at all the components and all of the surfaces.

While the locks are dewatered, we also take that opportunity to perform maintenance activities that need to be done or to make any repairs that we know about that need to be done.

Some typical projects that were performed on our locks include lighting upgrades and we replaced the power feeds to our locks, the electrical power feeds to our locks.

Now, for navigation aids, and Janet had mentioned this earlier, but the Corps of Engineers, they construct and maintain the mooring cells and TVA assists with the design and cost of materials.

We have a total of 51 mooring cells. The Corps maintains these because they actually have a fleet to do this. They have the equipment and the people to do this work. We have a new project to install new mooring cells at Decatur, Alabama.

Now for our bridge program. As Janet said, we have 92 bridges that we're responsible for.

Obviously, we have a lot more bridges that you saw than what goes over our dams.

These are conducted with an agreement with the Federal Highway Administration, and we are required to be in compliance with the same regulations as any bridge anywhere or all bridges everywhere.

TVA has a bridge program that designs, inspects and maintains the bridges. The overall purpose of the bridge program is to ensure bridge safety. Other responsibilities of our bridge program

include inspections, maintenance, and modifications to our bridges.

Some bridges are inspected annually, but most of our bridges are inspected every two years. There are certain bridges that require hands-on inspections, and these bridges are ones that have what's called fractured critical members or members that can break. We actually need to get a close-on -- close-up, hands-on lock at these members.

This involves a significant amount of record keeping and reporting responsibilities, and we maintain open communication with the Federal Highway Administration and local agencies.

In this picture we are inspecting Fort

Loudoun bridge. We have a truck, as you see, a bridge inspection truck that's used. There's an arm, if I can find the mouse, an arm that extends from the truck, and there's a basket at the end of it. The inspectors are in the basket, and they can actually get up and get a close look at the underside of the bridge.

Two of the projects that we have performed on our bridges, the first one is the Great Falls deck replacement. Great Falls is on the Cumberland River system. The bridge is 782 feet long. It's mainly used, or rarely used actually, just for local traffic. It is a wooden bridge, wooden surface bridge, and these two pictures illustrate the old wooden surface being removed and this is the new surface that's installed on the bridge. Now, this work was done in 2001. This is the finished bridge with the deck replaced.

This bridge was also used in the movie, The Specialist. I don't know if you saw the movie. I actually just watched the very first part of it the other day because I wanted to see the

bridge and the dam in the movie, but it's worth just watching that part. It shows how beautiful the area around there is.

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In the movie it stars Sylvester Stallone and Sharon Stone in a truck going down the road and it says it's in Columbia. Well, it's not really in Columbia. It's actually on the road beside Great Galls Bridge in Middle Tennessee. The truck goes across the bridge.

In the movie Sylvester Stallone is a demolition specialist. So he blows the truck up in the movie supposedly, but that's not why we had to replace the deck on the bridge. In fact, it really didn't blow up the bridge. It was done by computer simulation, but it does illustrate, if you can see that part of the movie, how beautiful that area is around Great Falls.

Another project that we have for bridge replacement is the deck replacement at Pickwick. This deck was replaced, as you see in the lower left-hand slide, a process called hydro blasting using a high pressure washer or high pleasure sprayer. It removes from the top surface down to the reinforcing bars. Then the new deck was placed over the top of the bridge. This work was done on the bridge. It's a 3,670 foot long bridge. It is a very busy road. It is over top of Pickwick Dam.

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The last bridge project I wanted to go over is the Watts Bar deck replacement. We worked several years with the Federal Highway Administration to get this project implemented. The bridge was in very poor condition. You can see on the upper-left slide some of the deck plate. There's a hole there and some of the concrete was actually falling through.

We had to add -- it's kind of hard to see, but there's a net that was added all along the bottom of the bridge. This was to catch components of the deck that would break through and fall. That's important because below Watts Bar in this area is the powerhouse. So we have workers in this area. The Corps of Engineers, of course, had a lock that's on the other side.

I was at Watts Bar for about a year one time for a project, and it was not uncommon for a piece of concrete to fall from the bridge deck.

In this picture the old bridge deck is being removed and the new one is being installed. This work was completed in 2005. The bridge is 2,360 feet long. The interesting thing about this bridge is it's one of the main access routes to Watts Bar Nuclear Plant.

Well, in summary, stewardship is a continuous cycle. It's a continuous process, a continuous process of inspections, assessing the condition of maintaining the assets, the structure, and for implementing projects.

And that's it.

CHAIRMAN BRUCE SHUPP: Questions?

Jimmy.

MR. JIMMY BARNETT: Talking about the maximum earthquake or the maximum flood, on the earthquake, does that vary from dam to dam or location of infrastructure to location of infrastructure?

MR. JERRY GIBSON: Yes, sir, it does. It varies based on location of the maximum earthquake.

MR. JIMMY BARNETT: I guess the, for want of better terminology, earthquake people do that or not TVA or does TVA come up with that

independently?

MR. JERRY GIBSON: Actually, when the original study was done it -- I'm not sure how. I can find out how that was determined. I'm not sure if it was done by an independent group or if TVA -- we do have an earthquake expert in-house, but I'm

honestly not sure if that expert did the evaluation or if we had another group do that, but I will find out.

MR. JIMMY BARNETT: Down in Alabama we were concerned with the New Madrid Fault for a while and earthquake insurance went up if you could get it. I think mine cost me $5 a month, I got it.

I was wondering since we have Wilson and Wheeler, and Pickwick is not that far away, just who came up with it and what kind of predictions they made?

MR. JERRY GIBSON: Okay. All right. We will find -- I will get that information to you.

MR. JIMMY BARNETT: The flooding, I assume y'all have enough records on the flooding to come up with a maximum practical flood level?

MR. JERRY GIBSON: Oh, yes. And Janet was heavily involved in that at the time. Do you want to discuss how that was arrived at, Janet?

MS. JANET HERRIN: What we did is we went in and we used a very deterministic approach. We determined the maximum amount of precipitation that could occur and used meteorological expertise, coupled that with antecedent conditions. I won't say it was the worst possible combination, but it's way

out there on the edge.

We put that rainfall on to the antecedent conditions. We assumed a sequence of storms. In this case we had a three-day antecedent storm, a three-day dry period, and then a three-day probable maximum precipitation storm. We then route

that through and we determined what kind of flooding you would have at various locations throughout the Valley.

Then we used that as the basis to evaluate the dams and could they safely pass that probable maximum flood. In those cases where they couldn't, that's where we went in and made the modifications. So that the dam would not over top, we added spillway and we increased the top of the dam, whatever was required to ensure that those dams could then safely pass that maximum flood.

MR. JIMMY BARNETT: What precipitated my questions was a series on the Weather Channel talking about the maximum things that could happen in various areas, Tsunamis and so forth.

MS. JANET HERRIN: Right.

MR. JIMMY BARNETT: I got to thinking about that when y'all were talking about it, you know, where did y'all come up in my neck of the woods

with the maximum probable event, either flooding or earthquake. It was just a curiosity question.

MS. JANET HERRIN: It's a very rare event. I've spent much of my career arguing over what's the probability of an occurrence of that. We came to the conclusion it's out there, one in a million, one in a billion, but it can happen.

MR. JIMMY BARNETT: Is the billion next week?

MS. JANET HERRIN: Pardon me?

MR. JIMMY BARNETT: Is the billionth time going to be next week?

MS. JANET HERRIN: Could be, but the forecast for the next ten days is a little bit dry.

CHAIRMAN BRUCE SHUPP: Austin and then Phil.

MR. BILL TITTLE: Jimmy, if you're worried about that, they're looking for people to

ride that truck, that arm down under there. If you retire, you might want to consider that.

MR. JIMMY BARNETT: What's the pay?

MR. AUSTIN CARROLL: On those bridges, those are on, you know, county, state, federal thoroughfares, why wouldn't they pick up, you know, the maintenance and everything on those bridges or do

they contribute to it?

DR. KATE JACKSON: They do not contribute to it, and we have had those conversations with them for decades. They don't have the money for it.

MR. AUSTIN CARROLL: Tell them you don't have it either.

DR. KATE JACKSON: We have. And we work through available appropriated funds where we can.

MS. JANET HERRIN: Watts Bar is a situation where we have had a cost share with the Federal Highway Administration to redeck that bridge, which is why, as Jerry talked, it took a little longer than we had expected because we had to work through the funding arrangements for that.

DR. KATE JACKSON: On the ones that you're familiar with, the ones up there over by Land Between The Lakes, we've had those conversations for decades trying to work out some arrangement where we could transfer the responsibility for those that were not attached to water barrier structures particularly, you know, those are the ones that are the -- you know, the most obvious ones to attempt, and the state doesn't want them.

MR. STEVE ADAMS: For Watts Bar, like Janet said, we did cost share with the Federal Highway Administration, and they paid for 80 percent of the cost. So for the bridge work on highways, we do try to cost share with the Federal Highway

Administration.

MR. AUSTIN CARROLL: Another question, are there other significant dams in the Valley and do you-all keep an inventory if there are, an inventory of those that could fault and cause problems for your reservoirs or whatever?

I mean, I don't know. Are there a bunch of others out there, private dams and stuff like that could --

MR. STEVE ADAMS: There is a national inventory of all the dams that's kept and we do keep track of that.

MR. AUSTIN CARROLL: I mean, what are those people doing? I mean, if they -- I mean, can it have a domino effect, you know, if this one fails it will cause others to fail?

MS. JANET HERRIN: We have privately owned dams within the Valley. For instance, Alcoa owns four dams. They are responsible and they have dam safety responsibilities as the owner as

determined by FERC. They are very strict requirements. They have to do the emergency preparedness.

We work emergency preparedness drills together, because in this particular case we have Fontana upstream, we have got Tellico and Fort Loudoun downstream. So we will drill together so that we do understand and work very closely together so that we understand that domino effect that you just described, but as a private owner they have the same responsibilities that we do. Ours are determined by the federal guidelines for dam safety and theirs are determined by the FERC regulations.

MR. AUSTIN CARROLL: So they are going through similar type measures that you're going through?

MS. JANET HERRIN: Yes.

MR. AUSTIN CARROLL: Okay. I thought, well, if they are not doing it, it could have a domino effect.

CHAIRMAN BRUCE SHUPP: Phil.

MR. PHIL COMER: On one of the dams you mentioned that when you did an earthquake test you later added 14 feet and that you had a liquefaction.

MR. JERRY GIBSON: Yes, sir.

MR. PHIL COMER: How did you determine that? That amazes me. What kind of a test would you -- how could you decide that -- to create a --

MR. JERRY GIBSON: It's actually done by analysis and not physically by a test.

MR. PHIL COMER: Is it a computer study then?

MR. JERRY GIBSON: Yes, it is.

CHAIRMAN BRUCE SHUPP: I have a question. You not only have to maintain people that can find the problems, but you have to maintain people that can fix the problems, how do you do that?

MR. JERRY GIBSON: Okay. Good question. We have people that -- we do have the staff to find the problems. We have staff of inspectors and civil, electrical and mechanical engineers. We do have to manage attrition, of course. Just as all the other parts of TVA, the workforce is aging and leaving, so we have to plan to bring in inspectors early enough so they are up to speed and ready to go in time when they are needed.

We have a maintenance staff that works with actually contractors. Most of the actual physical maintenance is done by contractors, one of

our support partners, but our maintenance staff works with them to perform that.

In fact, on the pictures on the wall, the third one over from the right is two of our

staff -- two of the people on our staff. The person on the left is Susan McCollum that's in our mechanical group, our mechanical design group, and Web Patton is in our maintenance group that actually does maintenance on -- like the hoists that I showed for Ocoee No. 3, he does maintenance work on that type of equipment with support from our partner for labor.

Does that answer your question?

CHAIRMAN BRUCE SHUPP: Yes. It just seems like a giant task --

MR. JERRY GIBSON: It is.

CHAIRMAN BRUCE SHUPP: -- to maintain the skills to fix stuff. My father-in-law was a mechanic at a cement plant. A lot of times they would -- you know, the decision on how to fix things would come down to him as a lowly mechanic because of the history of the machinery that you had to be familiar with to know how to get at fixing it. I just wondered on a scale that you're working at, how you can maintain those skills.

MR. JERRY GIBSON: One thing that we have done to help with that is we have put in place -- you know, we're losing the knowledge that you're describing, you know, folks are retiring and leaving. So we're putting together standardized maintenance procedures that will list the various steps of -- whether it's a piece of equipment that you're describing or a hoist, the steps that need to be done to maintain that, and they are in detail.

It even lists the safety equipment required, what you need before you start, what lubricants you might need, you know, various tools that you need before you start. So we're putting that type of thing in place to help with that problem. It's a standardized maintenance process

that we have.

MS. MILES MENNELL: I'm fascinated by your comments in preparation in the event of an earthquake, and I know that we have fault lines and all that kind of stuff, but educate me a little bit more, please, about the significance of the earthquake threat in the Tennessee Valley region.

MR. JERRY GIBSON: Oh, gosh. I'm not the right person to do that.

MS. MILES MENNELL: Well, just tell me

something. Make me feel better.

MR. JERRY GIBSON: Actually, can we let Gary -- Gary Brock, as part of his presentation, is going to talk about that.

MS. MILES MENNELL: Then you're going to talk about that. You don't want to give me a preview, okay.

MR. JERRY GIBSON: He's covering concrete growth. He's covering seismic issues. So that's one of the things he's covering.

MS. MILES MENNELL: Then I shall be patient.

MR. JERRY GIBSON: In fact, he has charts. I shouldn't tell you.

MR. PHIL COMER: I remembered my other question. I had forgotten it a minute ago.

Janet, you mentioned that within last the ten years or something you did a flood risk analysis and you went around and raised certain dams.

You did that at Douglas, and it appeared to me, as a non-civil engineer, that you raised it about 5, 6 feet whatever, and it looked like it was about a foot thick and 5 or 6 feet tall.

How did you anchor it? How did you -- I mean, it appeared to me that if the water got that

extra height it would just knock that off in a hurry?

MR. JERRY GIBSON: It's not a

free-standing wall. It's anchored into the reinforcing structure for the dam.

MR. PHIL COMER: Anchored with what?

MR. JERRY GIBSON: The steel.

MR. PHIL COMER: You tied it in with the steel in the dam that existed?

MR. JERRY GIBSON: Yes, sir.

MR. PHIL COMER: Is it only about a foot thick? That's what it looks like.

MR. JERRY GIBSON: Yes. It's not a wall. Here's the structure and it's just poured on top. There's actually steel reinforcing that was installed. Again, it was tied to the existing steel reinforcing from the dam structure. Then all you see is the concrete. You don't see the structural reinforcing inside of it.

MR. PHIL COMER: I have worried about that every since I saw it.

MR. JERRY GIBSON: But calculations have all been made and it will withstand.

MR. PHIL COMER: I woke up in the middle of the night wondering.

MR. JERRY GIBSON: Sleep better.

Sleep better.

DR. KATE JACKSON: I'm surprised you didn't e-mail us in the middle of the night.

MR. KENNETH DARNELL: It's nice to know there's people in the Valley keeping an eye on those important issues for you.

How successful have you been at migrating some of these things, like bridges? I assume that the locks once were TVA's responsibility and now that's mainly Corps of Engineers. How successful have you been in some other aspects of this in getting it off to other agencies?

MR. JERRY GIBSON: You're talking about bridges specifically? Limited success for

bridges.

We have -- when we purchased or made a reservation, say, like down at Great Falls, there were bridges that were purchased when we purchased the reservation, okay, back in the '30s, I think, whenever that was. The county that's in the area, we have approached them about taking those over, and they are not interested in that.

Some we have had success, but the ones that we have now are, I think, pretty much the ones we have not had success on.

DR. KATE JACKSON: Let me make a statement. We don't have an interest in transferring our infrastructure to other agencies. As a Federal Agency we have, want, and implement the responsibility for managing these assets.

So there are some things that we look for additional cost share. There are some things that we don't believe are appropriate or necessary for the ratepayers to bear the cost of, not all capital projects.

Just in the case of Kentucky lock and Chickamauga lock, because of the hundreds of millions of dollars required, it's an inappropriate investment for solely the ratepayers to shoulder that. So we worked very closely with the Corps of Engineers, recognizing that they have access to appropriated funds that we don't.

We will still be the asset owner at the end of that process. So I want to make sure that no one walks away with any kind of misconception on our desire not to be in this business.

We have, since the day our infrastructure was built for navigation, had an incredibly well-knit and well-oiled relationship with the Corps of Engineers with a fairly clearly

specified set of responsibilities on how we differentiate our O&M expenditures and their O&M expenditures, our capital expenditures and their capital expenditures.

That memorandum of understanding has evolved over time, but at the end of the day, our assets, our desire, our responsibility.

Do you want to add, Janet?

MS. JANET HERRIN: No.

MR. TOM VORHOLT: I just wanted to point out that the barge and towing industry through a fuel tax is also paying 50 percent of new construction cost at Kentucky lock and Chickamauga.

DR. KATE JACKSON: Well, assuming that that money gets appropriated there.

MR. TOM VORHOLT: Well, Congress has to do their job.

DR. KATE JACKSON: Yes.

CHAIRMAN BRUCE SHUPP: Any other questions?

Thank you very much. Good job.

MR. JERRY GIBSON: Thank you. Appreciate it.

CHAIRMAN BRUCE SHUPP: Lunch is ready. It's in the room back in here. You get to it at the back end of the hall. We will resume at 12:45.

(Lunch recess.)

CHAIRMAN BRUCE SHUPP: Okay. Let's take our seats, please. All right. We will start the afternoon session.

Before I introduce the next speaker, I'd like to remind you that if you haven't talked to Sandy about your plans for supper, do so. She only has about half of the Council that have signed up so far. So if you're going to supper tonight and if you need transportation, let her know. We will remind everybody later again, but don't forget to do that.

All right. We're continuing with the infrastructure and emergency procedures. To kick us off this afternoon is Gary Brock, who is the Manager for Navigation and Hydraulic Engineering.

Gary.

MR. GARY BROCK: Thanks, Bruce. Jerry Gibson talked about what I would describe as normal or routine maintenance with TVA. I am going to talk about special infrastructure issues or I would call it probably more non-routine.

We will talk about two major issues here, seismic, and I will give you a pop quiz at the end. When I say seismic, what do you think of?

MR. PHIL COMER: Earthquakes.

MR. GARY BROCK: Thank you. You got it right. And hopefully I'll address part of Miles' question this morning about why earthquakes in the Tennessee Valley.

Another pop quiz, where do you think of when normally you hear of earthquakes?

MR. PHIL COMER: California.

MR. GARY BROCK: There you go. So my first slide is not going to be in the Tennessee Valley, it will be in California.

Anyway, we will talk about seismic hazards or earthquake hazards and concrete growth as current issues or special issues that we're dealing with.

Here's a picture of what used to be an earth fill dam in California, Lower San Fernando Dam in 1971. This was what it looks like after an earthquake. This is the earth embankment. This is the roadway over the dam. In this case, the dam failed, slipped off into the reservoir, and the reservoir was lowered as a result of this event.

This is a picture of downstream of San

Fernando Dam. Over 80,000 residents had to be evacuated after this event. This is what we're trying to prevent in TVA.

A couple of you folks have mentioned New Madrid or New Madrid earthquakes. Well, this is one of the important earthquake zones that affects the Tennessee Valley. These are the earthquakes that have occurred in this area over the last 30 years. There's a lot of them.

Of course, New Madrid is in the boot heel of Missouri. It's near West Tennessee and near Arkansas and Western Kentucky also.

We have evidence of multiple large earthquakes about every 500 years. The key word I didn't say here is sequences. As you will see in the 1800s, early 1800s, it's a sequence of events, not just one.

Remember this too, this is the most important source of earthquake hazard for the Tennessee Valley. In the winter of 1811, 1812, starting in December and going through February, there were three large events. The map indicates the magnitude of New Madrid that occurred in 1811 and 12 as compared to the earthquake that occurred in San Francisco in 1906.

What I want you to remember here is the difference in affected areas. The New Madrid earthquakes affected a much larger area than the California earthquake in 1906.

This shows the intensity of the ground shaking in the particular areas, and it affected essentially most of Mid America, as well as most of the Southeast, including the Tennessee Valley watershed area.

The Roman numerals indicate different intensity of shaking, and obviously the intensity of the shaking is greatest near the source of the

earthquake. At a level eight we would expect that well-built structures would have moderate damage. Poor built structures would have severe damage. In an event like this, you could also even see water levels change in wells. So that was definitely a significant event.

The magnitude in decimals, 7.8, is an estimate for California. That's the intensity of the earthquake at its source. One of the things I would also note here is that we have -- that the frequency occurs much greater in California, but the intensity at New Madrid can be much greater.

This is an excerpt from text that was observed during a visit. These guys were on the Mississippi River in 1812. I would like to point out

that part of it says that it is evident that the earth at this place or below had been raised so high as to stop the progress of the river and cause it to overflow its banks.

About 100 years later you can still see a lot of the ground disturbance. What one would expect to see would either be flat or gently rolling and not this upheaval. So we know and have direct evidence that we have had severe, strong earthquakes in the Tennessee region.

What have we learned over time about these earthquakes?

Well, earthquakes large enough to cause widespread liquefaction, Jerry discussed that this morning, again, that's the shaking of earth structures where they become quicksand like and they are no longer a water barrier happened every few 100 years in the New Madrid seismic zone.

In addition to the 1811 and 12 events, we know there were at least two strong ground-shaking earthquakes in the past 2,000 years. There is

evidence of several sites of significant earthquakes prior to about 900 A.D.

So what does this mean?

We have large earthquakes that occur

in the New Madrid area about every 500 years, 4 to 500 years. So we know that we can have major events that affect the Tennessee Valley and our structures.

This includes some historical and some instrument data that's occurred since 1774. This, again, is in magnitude, and the smallest magnitude here is 3 and it goes up to 7.9. A 3.0 earthquake is about at the threshold where we, as people, can begin to feel the effects of the earthquake. Less than that we probably cannot feel the effects of it.

We have an area outlined here, which essentially defines the TVA region with a little extra boundary, a little area here, and you can see earthquakes at New Madrid just right outside our area. Also, we have some earthquakes though over in East Tennessee as well. We have a study area. This includes the entire area that -- where earthquakes can effect the TVA region.

I might note that I was talking with Janet this morning. This is Charleston, South Carolina in an 1886 event where about 60 people were killed in that particular event. So we have more than just New Madrid that affects our area.

This chart shows earthquake activity from 1977 to the present in the Southeastern United

States. This is a zone of persistent small to moderate earthquakes in Eastern Tennessee, Northwest Georgia, and down into Northeast Alabama. I was talking to one of the staff and he says, well, we normally describe this as a zone going from about Middlesboro to Fort Payne, Alabama.

Now, what's important here and what's different from the chart that we looked at or the

graph that we looked at about New Madrid, there are no large magnitude earthquakes in historic time in this region. All of them have been less than six.

However, these earthquakes are the largest contributor to high frequency ground motion for most hydro sites, and I will talk a little bit about low frequency and high frequency earthquakes in just a moment.

So now we know that earthquakes have occurred in the Tennessee region, New Madrid, as well as in East Tennessee, and they have occurred over a long period of time of varying magnitudes.

So what have we done about it?

Well, we have considered earthquakes in our design from the very beginning. A report back in 1936 indicated that the possibility of severe shocks in this area should be considered in the

design of dams. A little later a report from the hydro Board of Consultants, that's the group that Jerry described earlier that's a third-party consultant for us, essentially what their comments or there conclusions were is that stresses due to earthquake or design criteria for projects from Guntersville upstream didn't need to be considered. However, below Guntersville we needed to consider design -- it in our design criteria.

So seismic design of our facilities, in 1939 Kentucky Dam was the only TVA dam originally designed for earthquake shaking. Part of this has to do with the sequence of when our projects were built and constructed. Wheeler was actually the second project completed by TVA shortly after Norris.

In 1977 -- I think Jerry showed the Teton Dam failure. Well, in 1977 to 1979 this was the advent of the Federal Dam Safety Program and

resulted in review of expected performance of TVA dams and earthquakes. So in the early '80s we took a systematic analysis of all of our dams, and we have done various degrees of assessments and even corrections at a couple of projects or modifications at a couple of projects since that time.

So we did a detailed analysis in the

1980s, and we updated it in the late '80s and did detailed studies at Kentucky and Pickwick and Blue Ridge and I believe Beech Dam. Then in 2004, working with one of our consultants, Geo Matrix, we have updated again the seismic hazard study.

Let me say something here as I understand it. The earthquake criteria has not changed a lot since the advent of the federal guidelines, but what has changed are the analytical tools that are used in developing seismic hazard maps and also in the tools and analysis of doing the assessments of the dams and also in determining what the fixes for any deficiencies may be. So that's what's really changed and that's why we have kept looking at these particular issues.

As part of this study, we have updated our hazard maps. This particular map shows the ground shaking hazard for low frequency. Now, low frequency ground shaking, I was trying to look for a good analogy, and I think the best I could come up with, if you have ever been on a bridge or an overpass and you may be sitting -- like when you get off the interstate to come into Knoxville, that one particularly, you will sit there and you will feel a shake, well, that's a low frequency vibration, a low

frequency shaking.

My wife asked me the other day, was that the car or is that you or is it the bridge? So I told her it was the bridge, of course.

One of the things that you will notice

is this chart is in G's, that's the acceleration of the ground. And as you go from the light pinks, and we had a discussion whether it's fuchsia or purple or whatever it is, Janet would say it's purple, these are the lower values. And as you move west, and guess where we're headed for, the New Madrid area, the acceleration increases, and it increases significantly as we get into this area.

I believe the acceleration goes up to about four here, I believe, maybe four. What's important here is you see a high intensity here, a lot of shaking here. When you get to Nashville in the East, it's relatively uniform.

Now, let me say though, these types of earthquakes have the most impact for potential effects on earthen dams. And as you have saw earlier, we have several earthen dams.

Another type of earthquake or the results from earthquakes are high frequency, which means low frequency is like the bounce on the bridge,

this is much quicker. And I would guess most of us in here today have experienced that and the results of this.

As you can see, a lot of this area is in the upper East Tennessee area, and the other chart that I showed you, remember, from Middlesboro to Fort Payne, that's the type of earthquakes these are. Late at night you have heard china rattling maybe, maybe some things fall off the shelf when some of these are maybe three and a half or so.

Anyway, we could have two areas of this type of earthquake in East Tennessee and also in West Tennessee. Now, these types of earthquakes or the effects of these earthquakes is greater on concrete structures than it is on earthen structures. And as you may guess, we have some concrete dams. As a matter of fact, I believe Janet indicated we have

26 concrete dams in the Tennessee Valley.

Okay. So what have we done as far as any mitigation or modifications?

Well, Jerry actually mentioned the one at Beech, that was in the late '80s, early '90s, that was an earth structure, so what did we do, we added additional mass at the toe of the dam or where it intersects at the edge of the dam. We also did some

post tensioning at Fontana back in the '80s, and I will describe in a little more detail what post tensioning is when I get into concrete growth.

Blue Ridge Dam, well, this is an embankment dam, earth dam in Fannin County, Georgia. It's on the Toccoa River, about 12 miles from McCaysville. This was one of the projects we acquired back in 1939. It was built in the 1920's and it was built by a technique called hydraulic fill. It is an earth embankment, but it is not compacted earth.

We have concerns about this structure and we're working right now doing an assessment and identifying potential alternatives to fix the dam. This is one of the structures that we will need to fix.

A summary for seismic or earthquake issues, earthquake hazard is in the TVA region. We have two principal areas, primarily from the New Madrid seismic zone, and with it's low frequency, but I might add one of the big things at New Madrid is it's not only low frequency, it is high energy. It has a lot of high energy with it. And as you can see, back in 1811, 1812, you could feel those shakes throughout the majority of the Southeastern United

States.

We also have hazard areas in the East Tennessee region, and it's to a lesser extent, but these particular earthquakes do affect concrete dams

more. The concrete dams perform better during earthquake shaking than earthen dams.

We're under review of the seismic evaluation at Blue Ridge. We know we're going to have to do something there. We may also redo evaluations of other dams in the future.

What I want to end this segment with is to let you know that we will make sure that the dams perform as needed with the ground shaking that we expect.

Jerry briefly mentioned concrete growth. I think he described it to you, but I will do it again since you have eaten lunch and you may have forgotten about concrete growth.

Some folks may scratch their head and say, now, how does concrete grow or does it grow?

Well, it does, not always, but in certain situations. It's called alkali-aggregate reaction, and that occurs when the alkalis in the cement react with minerals in the concrete aggregate or the rock that you use in your cement. The slight

increase in the volume of concrete causes disruptive movements in concrete structures over a long period of time.

I sat in on a session yesterday and someone asked said, well, don't expansion joints take care of this?

And his answer was, well, normally concrete does not grow, especially massive concrete structures, they actually shrink a small amount. So concrete growth, where it occurs, is unexpected.

Currently we have documented evidence, which means we know concrete growth has occurred at Boone, which is a project up near Kingsport, Tennessee, Fontana, which Jerry discussed for several things this morning, near Hiwassee over there in Murphy, North Carolina, Chickamauga Dam, it's the

entire project there.

We have been asked, well, is this a TVA problem?

Well, it's a TVA problem, but it's not only our problem. It's not unique to TVA. There are at least 20 other dams in United States where the effects of concrete growth have been documented. There's over 100 of them worldwide. So it's not an isolated situation.

Now, let me add this too at this point. We will -- the question comes, well, didn't you know about it?

Well, in 19 -- the late 1930's we were not aware of concrete growth. However, since then, in the last 50 or 60 years, we have made a lot of -- we have learned a lot about concrete growth. So there are ways for new structures that we can prevent or extremely limit any concrete growth in the future.

One of those is being very prescriptive with your concrete; that is, with the cement that you use, do a lot of analysis on the aggregate to make sure you have compatible materials. We can even add mixtures to the concrete to keep this from occurring in the future, but we're dealing with these four projects that we have because we didn't have that knowledge back in the '30s.

So what are we doing about it?

Well, we're doing several things. For one, we're monitoring these projects, collecting data. We're using that data with mathematical modeling to be able to predict what's going to occur in the future. We use that data then to help us decide what's the appropriate fix and when to do it in the future. So we're actively managing and

working with these projects on an ongoing basis.

One of the techniques that we use is slot cutting. What happens when the concrete

continues to grow, it builds up stresses. Well, one of the ways to address these increased stresses is you provide an expansion joint, if you will, or a way to relieve itself, we have also used that, and don't laugh at that, but we cut a slot in the structure.

This particular one is on the approach wall at Chickamauga lock, and this one is about a 4-inch cut. It's like Wayne Poppe described, he said, well, describe this like you have taken a thin slice of bread out of the loaf, it then enables, in this case, the concrete, we call it rebound, it gives the concrete room to grow.

And guess what's happened here?

This has been cut before. This is at least the second cut, and we will have to go it again.

I mentioned post tensioning before, that's another technique that we use to address the concrete growth effects. And in this case we put a bundle of steel tendons. We install them. We have to drill a hole, install them either into bedrock or to the base of the dam, something that's very

competent.

You anchor those tendons and you pull pressure on them or tension, cap those off, and they will keep the structure from shearing, which means sliding at the bottom, or keep it from moving. It will also retard vertical growth of that particular block or structure.

I was trying to think a good thing to compare that with. You may not have noticed the -- we have a suspension bridge, it's a foot bridge at Appalachia, which has two cables that support the structure and you have vertical cables in between, well, the cable actually helps anchor the top to the bottom, that's a real simplistic way of looking at this. Essentially what it serves as is a steel beam

in order to provide stability to the structure. Anyway, we do monitoring, we do analysis, and we do remediation.

Now, let's go in and look at each one of the structures and see what's going on. Now you're -- you will see me talk about a three-inch permanent vertical expansion. So what? Fontana is 480 feet lying, that's what Janet said this morning. We have got a 4-inch upstream movement. So it's not only moving upstream, it's -- I mean, vertically it's

trying to move upstream also. Well, what's important about that is not only this structure but others.

Jerry talked about the spillway gates. He talked about tolerances and clearances. We designed those things so that they will operate efficiently, but also, we don't want water flowing around them. So they are built with very close tolerances.

You will hear me talk about Chickamauga Dam and powerhouse where the pit -- where the turbine sits is going -- is becoming oval or egg shaped. Well, we designed the unit to fit in a circle, a very round pit, not an oval, and we designed that to minimize any water loss going around the edge of that runner so we have very tight tolerances.

So a small amount of growth or movement can really affect the performance of our equipment. So that's why it's important. Even though they may seem small, they are not.

Oftentimes I think that -- I talk about inches here when I talk about concrete growth, I think most of the time people would say, well, the engineering staff is worried about micrometers or very small distances, no, these are not, these are

inches and several inches. So just keep that in mind.

So, anyway, back to Fontana. We have 4-inch vertical, 3-inch -- a 4-inch vertical, 4-inch upstream movement. We have had -- because of that, you have had spillway gate misalignment and binding. I told you they are designed with small tolerances and they bind. If they get out of alignment, they bind. And Jerry said we have got to have them operating all the time. So we have got to realign them.

We also have high stresses and excessive movements and significant structural cracking in the curve section. There is a small portion over here between the main part of the dam and as we move over towards the spillway there's a component that has suffered a lot of stresses in this particular area here.

So what have we been doing at Fontana?

Well, other than monitoring and doing the modeling, in the late 1980s the upper 60 to 80 feet was dam post tension, and I believe that was actually the piece for the maximum credible earthquake. We cut a slot. Now, notice the slot is 32 by 33 an inch in 1975, but, look, we had to recut

it '84 and '99. We post tensioned the curved section in the mid '70s and mid '90s, and we have cut spillway slots again, these are half inch, in '99.

So what's slot cutting?

This is a pretty dramatic view, I think. This is the work crew that's removing a piece of the slot that was cut in 1999. They actually cut this with a wire saw, but this is a large piece that's removed. Now, this goes through the structure.

Somebody said, well, doesn't it leak?

Well, no, it doesn't leak because we have to put a water barrier on the back side of the dam. Frequently we call it a blister coffer dam.

It's a small structure that keeps water from flowing through the structure.

Jerry's favorite project, Hiwassee, I think in more ways than one, between spillway gates, concrete growth, pump turbines and other things. You will notice here that we have the same type of effects. They are just a little less than they are at Fontana. You have still got an inch and a half permanent vertical expansion. It's trying to move back upstream. We have got spillway gate binding. We have got high longitudinal stresses and

significant cracking.

In the powerhouse, as you will see at Chickamauga in a moment, they are causing misalignment problems and roundness problems. Jerry mentioned the gate failure, we believe that concrete growth was a contributor to the gate anchor supports.

Other than the vertical growth you will frequently see excessive cracking and spalling not only at Hiwassee, but I think even more so at Chickamauga. And, of course, when you have cracking and spalling, you're going to have more problems with the surface. This is -- this was associated with the surface of the structure. The stresses and all were all down inside this thing.

Let me point out one other thing that's probably important here. The more massive the structure is, the less effect concrete growth will have. You can see these spillway components, these are the structures that support the gates. Well, they are not very massive. They also are exposed to moisture, moisture and solar effects, the heat, can accelerate the effects of concrete growth also. So just remember about massiveness is also an issue, and it will be more so at Chickamauga lock.

So what have we done at Hiwassee?

Well, very similar to what we have

done at Fontana. We post tensioned the piers in 2004, cut a slot here, cut a slot here, another slot here. This is the 24, 25th, that's an inch, and when you see it, I was up there when they were doing it, gosh, it looks bigger than an inch.

I said, "You mean we cut that all the way through the structure?"

"Yes, we did."

It's not all the way to the bottom, but it's a significant way down the structure. I guess, again, the slot cuts, recut, recut, recut. The structure and concrete growth doesn't subside, it continues. So we will be dealing with this issue.

Boone, well, we only saw evidence of concrete growth at Boone in 2000, that's only six years ago. To date no remedial measures, except for minor unit adjustments, but you saw what we've done at the other projects. One can expect that over time, depending on the rate of growth here, that we may be doing slot cutting, we may be doing post tensioning, for sure probably unit realignment, spillway gate realignment, those types of things.

Now, we come to Chickamauga, the lock, dam and powerhouse, we will talk about all of the components here. Yes, we have concrete growth issues at all of them. We have had unit misalignment and ovalling of throat rings in the powerhouse. Well, that's where the turbine sits.

As a matter of fact, the last time we did that we were about to the point where the tips of the turbine runner were about to hit the side of the wall, and that's not an easy fix.

So what we have to do is you have to go in and grind out and remove material. Then we go back in with a steel overlay, put that back in, then you go in and take a milling machine and make it round. So it's not a two-day fix. It's a timely

thing, but you have got to do it.

Spillway gate misalignment and binding, we have seen that before. I was talking to some of the gentlemen at lunch, the spillway gates at Chickamauga are vertical lift gates, and they were about to the point where, you know, they didn't move up and down -- up and down freely. So we have had to go in and realign the gates, and we have been able to do that.

At the lock we have had significant block movements, cracking, and high longitudinal stresses in the lock. Well, you may or may not be

aware that the lock and the dam is not a continuous pour concrete. It's poured in what we call blocks.

Well, in this case we have had block movements in the lock. We have had expansion joint problems on the spillway, and the reason we have that, the riverside -- not the riverside, the land side wall of the lock, the bridge pier sits on it.

Well, guess what happens when it's grown about 3 to 4 inches over time?

It's pushed the bridge pier up. In the mid 1980s we actually went in and removed the pier, shortened the pier, put it back in place. Well, 20 years later we're about -- we have got issues again here. The expansion joint has about run out of expansion. So we will have to do some modifications there in the future.

Another issue, the lower gate hinge assembly on the minor gate downstream almost failed in 1995. The concrete growth had pushed the pin up and it was out of alignment. The gate, it's a real simple mechanism, but it's connected to a very large component. The gates are very large there. Fortunately, one of Mike's staff noticed an unusual sound, and upon inspection, we saw we had a problem

and we were able to fix it.

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Over three-inch vertical expansion in lock walls since 1940, and this other one is a little bit more so, the lock's actually trying to move upstream and downstream. Total expansion is about 7 to 8 inches.

The concrete is trying to move in the least constrained position. So this part of the structure is trying to move upstream, that part of the structure is trying to move in that direction. It's also trying to move vertical. Not only that,

I've talked about massive versus less massive structures, the lock is a relatively less massive structure than the spillway and the other components of the dam.

We have water conduits that go through the lock that enable us to fill the lock and to empty the lock. It has water running through it. The walls are just left substantial and the spillway, and rightfully so, they don't need to be under normal conditions.

So the other thing, this massive piece right here intersects the lock.

Well, guess what it's trying to do?

It's trying to move that way. Well, it has, and it's moved somewhere about an inch. So

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we have got a little bit of a displacement of the lock into the chamber. So we have got Chickamauga lock being a real sport and it's moving vertically or it's moving horizontally and longitudinally.

So what are you guys doing about Chickamauga lock?

Well, lock and structure, okay, the interface of the powerhouse and the spillway, we cut a half-inch slot to relief the stresses there in 1997. We post tensioned 15, 16, 17 and 18 in the mid

'90s, post tensioned the spillway bays.

By the way, we're going to have to recut the slot this summer because -- as a matter of fact, I was down there when they were cutting that slot. During the day the stresses overcame the saw and they actually had it jammed. I think they had to wait until the next morning to be able free it.

Anyway, we have also realigned the spillway gates. We post tensioned the lock walls. Both of them have been post tensioned extensively.

How was the slot cut that I showed earlier?

Four slots have been cut in this one, and to me, that's what is significant. That thing is 4 inches wide, and it does rebound. We will have to

recut it probably in a couple of years.

So what else are we doing?

Well, in partnership with Mike and his staff from the Corps, they continue to get advanced maintenance funds in order to help address these conditions at Chickamauga lock.

A summary of concrete growth issues, well, we expect it to continue indefinitely at TVA. Remedial measures will be used, such as post tensioning and slot cutting, to manage the effects.

Again, like we're doing with the seismic, we will continue to monitor, analyze, modify, repair to stay on top of these projects. We feel comfortable that we can manage these projects well into the future, except the Chickamauga lock.

So how are we doing on that and what are we doing on that?

Well, we're looking in partnership with the Corps on a replacement lock at Chickamauga. In February of 2000 -- just to give you an update. In February 2003 Congress authorized the Corps to build a new 110 by 600 foot lock.

Construction began in July of 2004 with the relocation of some utilities and protective mussels that were in this area right here, so they

actually have done that, and we began road relocations.

In FY '06, which is this year, we will complete the road and bridge relocations, acquire real estate downstream that will be needed as part of the construction staging area and continue the lock design.

Probably more importantly, I think, Mike, we will be doing -- the Corps would be issuing a contract or an RVP for a contract to begin the coffer dam, which would enable us to build a new lock in the dry.

Let me just briefly go over this. The existing lock is located in this position. Part of the lock is upstream of the dam and part of it is downstream of the dam.

The new lock will be much larger. As Janet pointed out, it will be eight to nine times more efficient; that is, you can get that many more barges in the chamber at a time. It will be a 110 by 600, the same size lock that's downstream at all of our projects. It will be built to the riverside of the existing lock and it will all be downstream of the existing dam.

And Mike's staff is -- we're working

very closely with them on that. They are securing the funding for that. We're working with them in providing technical assistance. We're working to acquire the property downstream. We also did hydraulic physical models to assist in the proper design, not only of the structure, but also of the approach walls downstream.

So that project hopefully will be underway. We will all be glad when we get the coffer

dam under -- we get the award for that awarded and begin construction on that.

With that, I'm through.

CHAIRMAN BRUCE SHUPP: Questions? Comments?

Mike.

MR. MIKE BUTLER: This is more personal interest than, I guess, anything else. When concrete growth occurs, does it weaken the materials, the properties?

MR. GARY BROCK: I took that slide out. No.

MR. MIKE BUTLER: Okay. Then the second question would be --

DR. KATE JACKSON: Apparently it was a short slide you took out.

MR. GARY BROCK: Exactly. What it shows is the strength of the concrete is not compromised. The problem it causes is in the cracking and in the misalignment of the equipment. Obviously where we have the cracking and all of that is a problem, but the concrete strength is still okay.

MR. MIKE BUTLER: Where you have the new lock structures joining up to existing structures on Chickamauga, how are you going to take care of it if you have concrete growth with the old ones as they meet up with the new ones?

MR. GARY BROCK: They are very well aware of that, and there will be a special design. I don't know exactly what that will be, but, yes, that is under consideration, not only concrete growth here, but I might add we have included seismic design criteria in the new lock. Yes, that will be taken care of and addressed. Good question.

MR. MIKE BUTLER: I read during lunch when I was checking e-mail that Knoxville had a 3.2

earthquake at 8:15 this morning.

MR. GARY BROCK: Oh, really?

MR. MIKE BUTLER: That's what I read on the news.

MR. GARY BROCK: Jeff, you need to update your chart, buddy. You need to add one more in the East Tennessee seismic zone.

CHAIRMAN BRUCE SHUPP: Any other questions?

MR. AUSTIN CARROLL: I mean, all of this sounds good, but aren't you -- isn't TVA looking at itself and they are sort of doing kind of a self-audit on these structures and saying, you know, we think this is incorrect and we need to fix this?

Do you have outside people coming in that may look at things a little bit -- ever have them come in and look at it that may look at it a little differently than -- you know, sometimes, you know, when you're in the middle of the forest it's hard to, you know, figure out what trees are trees.

MR. GARY BROCK: Good question. Well, the short answer is, yes, but I will elaborate just a little bit.

Hydro Board of Consultants, as Jerry mentioned earlier, they have been actively involved in every one of these projects. Every one of these projects are discussed, I think, at every one of their meetings. So they review what we propose and make recommendations on what we're doing, are we

deficient, we rely on them. We also talk to other agencies. Mike, his problems are at Center Hill, I believe, on concrete growth.

MR. AUSTIN CARROLL: But, I mean, do they actually come and look at the infrastructure themselves?

MR. GARY BROCK: They went to Fontana last week. Yeah, they actually not only meet in here

in a room, they actually go to the site and do visual inspections, too.

The main thing here is this will be ongoing. It is expensive, but it's something we feel like we can manage. You can't control it, but you can manage it.

MR. PHIL COMER: I would like to comment that Karl Dudley and I helped them at Fontana one cold November day a few years ago and gave them our expert opinion.

MR. AUSTIN CARROLL: I will sleep better now.

CHAIRMAN BRUCE SHUPP: Thank you very much.

MR. TOM LITTLEPAGE: I don't want to ask a questions, but I will say I read a book recently, I think the name of it was, "The Day The

Mississippi Ran Backwards," it was an account of that New Madrid earthquake, and it is a very interesting read for anybody that wants more information on how catastrophic that thing was.

MR. GARY BROCK: You can see those gentlemen that were on the boat in 1812 and they had actually tied up to an island that night and they were awakened by the rumbling and growling of the ground. They were scared and they actually got in the boat and went out in the river. It was significant.

One more thing and I will shut up. That's the thing, even though that occurred in 1811, maybe these things only occur every 400 or 500 years, they have occurred and they are going to occur again.

MR. PHIL COMER: That's right. James Audubon went through there at the same time and left a written description of it in 1811.

CHAIRMAN BRUCE SHUPP: Thank you,

Gary, appreciate it. Good job.

The next speaker is Wayne Poppe, project coordinator. He's going to talk about emergency preparedness.

MR. WAYNE POPPE: Thank you, Bruce. After that first presentation, I know everyone just

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ate, while I am getting ready, why don't you stand up and stretch your legs and then you can sit back down, get a little blood in your legs. Stand as long as you like and we'll get started in a leisurely, informal sort of way.

So we have been talking about emergency preparedness all day, we just didn't call it emergency preparedness. Everything we have been talking about is a component of emergency preparedness.

If you go back to Steve's presentation, the first presentation this morning, that blue line that he kept talking to, his flood control line, when Steve violates that flood control line he compromises our flood risk, which is -- that's a component of emergency preparedness. We have that line there for a reason, it helps us manage that flood risk.

Jerry talked about -- well, even before Jerry, Janet talked about all the different structures we have and where they are and how big they are and how many there are and what's below them and what's around them. The first part of emergency preparedness is knowing what stuff you have, what are the things that you have to take care of and where

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are they located and when were they built and what was the technology that was used, that's all a component of emergency preparedness.

Jerry came and talked about preventative maintenance and corrective maintenance. If you don't fix what's broken or if you don't take

care of things that break, certainly you compromise your ability to respond to an emergency.

Gary talked about some of the big projects, concrete growth and seismic sorts of evaluations, again, that fits -- those are kind of big corrective maintenance sorts of things, but they are massive programs and they are all part of emergency preparedness.

So in spite of all of that and in spite of all the preparation, things happen. Mother Nature has strong forces we have to deal with. Terrorists have strong forces we have to deal with. Aging infrastructures have strong things inherent in them that we have to deal with.

The upper left-hand corner is -- I believe that's Chattanooga or Chickamauga in May 2003 a week ago. So three years ago if we would have had this meeting, I'm pretty sure Bill Tittle wouldn't have come because I think he would have been busy in

Chattanooga trying to decide how far the water was going to get up on the carousel in Coolidge Park because that's what we were dealing with, 225,000 cubic feet per second going through Chickamauga. Today it's about 21,000 to put it in perspective, normal, nice spring day.

That could have been -- Phil, that could have been Douglas just as well. It could have been August or September of 2004 and Francis just came through, Douglas was filled up, the whole French Broad was full of water and we had another 12 inches of rain predicted, something you have got to deal with. You're dealing with the extremes. Everything you deal with in emergency preparedness is dealing with the extremes.

The lower left-hand corner, I don't know if you know what that is, but that's Watts Bar hydro control room or control building. In 2002, the

fall of 2002, we got a call about 8:30 in the morning saying that the control room was full of smoke, what do we do? It happens. That happened during the day during office hours, that's an important thing to know.

The one on the far right, everybody knows what that is, another tragic event. It

happened on a morning about 9:00 in the morning. I remember very well sitting in my office and somebody -- and I was talking to then the manager of engineering, who has since retired, about something. A plane slammed into the World Trade Center. Ten minutes later somebody comes running in and said another plane slammed into the World Trade Center. That was the end of our conversation. We ran to the emergency room.

You're never dealing with the norms in this world, but if you have the things done that Jerry and Gary and Janet and others talked about this morning, you can mitigate part of your response needs.

Let's go to the next slide.

So I don't know who's been in the military, but emergency preparedness is just like the military. You prepare your plans. You prepare your facilities. You practice your procedures. You test your procedures. Then you get up the next morning and you do it again and then you get up the next morning and you do it again.

And why does the military do that?

It's serious business. They are dealing with unknowns. They are dealing with

people's lives. They are dealing with property. It's serious business, just like this is serious business here.

So let's go to the next thing.

So I just want to give you a bit of an overview of some of our procedures, some of the things that we do to practice, some of our testing, some of our training, some of our responding. Bill Tittle is going to talk about local EMAs and how they manage things in coordination with us. We also have a state representative here. Mike Ensch is here from the Corps. They are going to talk about that. So I am not going to get into any of those specifics. You're going to hear more about specific emergency management agency responsibilities and coordination with TVA in their talks. I'm not going to talk about it.

What I do want to talk a little bit about is things on the slide here. As you might expect, everything has an hierarchical sort of structure. There is a TVA emergency response plan. It includes responses for just about everything that you could think of, including preparations for bird flu pandemics to nuclear issues to a variety of things. I am going to stay away from those. I am

going to focus on the dam infrastructure that we have been talking about today, but we do have those in place.

So within our RSO&E and then within river operations, we have four basic components. I would say four basic components of a plan. We have the emergency action plans that are put in place primarily through dam safety and engineering.

Jennifer Dickerson and -- is Chris here? Jennifer Dickerson is sitting back there. She is primarily responsible, along with Chris Hughes, for putting those in place.

Within river scheduling we have a notification directory. In other words, when we get out of bounds somebody in river scheduling, that's Steve's group, is going to start talking to the local

EMAs about we have got these flood issues or we're expecting these flows. So we have, you know, some communication things going there.

We have a navigation or a waterway management plan. When we get into a situation, certain places in the river, and it's not all locations but many locations in the river, when flows get so high it becomes dangerous for not just recreational boating but commercial boating.

In the case of the 2003 flood, I think were western out of service at Chickamauga for approximately two weeks, Gary?

MR. GARY BROCK: Yes.

MR. TOM VORHOLT: Two weeks.

MR. WAYNE POPPE: Tom, you would probably know even exactly. So even after Bill was able to take a breath and he knew about the infrastructure in Chattanooga, Tom's industry was still dealing with high flows. So we work in coordination with the Coast Guard and Corps of Engineers on our waterway management plans.

Then at each of our hydro sites or our dam sites, we have site specific plans, site specific emergency switching plans. They have to be specific because each one of those things is different. There are common threats, but there are different responses depending upon the facility you're at.

Next slide.

To give you an idea of some of the things we deal with on our site specific plans, certainly we -- I showed you a picture, we have fire events, we have had them. It's an old infrastructure and we may have others. You need to know how to respond. That was a very serious fire that we had at Watts Bar. We were very fortunate with the outcome.

Certainly we have medical emergencies.

We had a medical emergency in the East Plaza today. I don't know if you noticed when -- I can't remember who was speaking, Janet, I think, was speaking, here comes the fire trucks, and what it was, a gentleman in the East Tower had a seizure, I believe.

And we have those happen at the plants. You have got to know how to respond because they are not in the middle of a city.

Certainly we have hazard material and emergency releases. In all of the navigation up and down the system, there is hazardous materials that is transported throughout the system that goes through our locks. We need to know how to respond to that if we have a spill off of one of those.

Natural disasters, I showed you a couple of pictures of natural disasters, certainly the flooding is a natural disaster to deal with.

Bomb threats, I believe I had just gotten to bed during Ivan at about midnight and at 2:00 a.m., I think it was Ivan, my phone rang, I'm sorry, it was the May 2003 flood, I had just gotten to bed, still about midnight, 2:00 a.m. my phone rang and we had a bomb threat in this building where our

river scheduling center is. We had to evacuate the building. It happens.

Civil disobedience, that's usually the TVA folks. I'm kidding. There are very civil disobedience things that you do have to deal with. Criminal activity and illegal entry, not uncommon these days.

Suspicious packages, what would you do if you found a suitcase sitting by the transformer yard at a remote dam? How do you respond? It happened to us last year at one of our facilities.

Certainly evacuation shelter and cyber threat is a major issue anymore. We have -- because

our systems are automated to the dams, like Janet pointed out or someone pointed out, we can control the little valve that's on one of those little dams over there in West Tennessee from upstairs. Cyber threats are real and we're dealing with those.

Certainly dam safety emergencies, flooding events, I think everybody in here is familiar with those. Gary talked earthquake events. Navigation events.

Loss of something called our hydro dispatch control cell, that is the group of -- a small group of people that works down in the bowels

of the basement in Chattanooga that actually dispatches each of the hydro plants. They can lose their communications and we have to deal with that.

Then emergency switching. We had a storm recently that took out some lines over in the Great Falls area and we had to do some emergency switching about 11:00 on a Friday night. It never happens during the day, and that's an important point. You have got a one-in-four chance of it happening during normal work hours. If you just look at the 40-hour work week there, it's about a one-in-four chance that an emergency is going to happen when you're in the office.

So it's one thing to prepare for when everybody is here, it's something else to prepare when no one is here, and that's 75 percent of the time, or very few people are here, I should say, because we do have 24/7 scheduling a lot of places.

My next slide, please.

So we do have several facilities that deal with our emergencies, and there are redundancies built into those facilities. We do have an agency coordination center in Chattanooga. If we have an agency event, more than one organization that needs to be involved, there is a place to go. A specified

place to go is a dedicated place to go. No one else uses it. It's not like you've got to clear the books out of the way or anything else out of the way. Everybody knows how to get there. It's controlled access. That's where you go.

We have -- and you're going to see this afternoon our Knoxville Emergency Operations Center, that's actually managed by the TVA police. We use it as a backup center for river operations, river system operations and environment. We have a space down there. Chris and Jennifer will describe how that works and everything that's in that facility today.

Our primary center when we're dealing with a dam issue is in Chattanooga. They will go through that. I think Jerry showed a picture of that center. Many of us get to call that home for hours on end, depending on the day and the situation we're in. Again, it's a dedicated center with redundant facilities as a backup.

And certainly our river scheduling center upstairs on the tenth floor, I think many of you have been up there and seen that, but what many of you may not know is there is a backup center that we can go to in the event of an emergency. If this

building, for instance, has a bomb threat, or if this building has to be evacuated for another reason, it's there.

There is a command post actually, and it's a mobile command post that we keep up to speed

in Muscle Shoals. So that's -- we have got several facilities. I can't emphasize enough the value of building redundancy into your facilities.

You know, by luck if you only had one place to go, what would be the place that was hit by something? The one place that you had an emergency

center. That's why it's so important to have those additional facilities.

Go ahead.

In addition to facilities, it's important that you have got a number of people and lots of backup equipment that can respond to an emergency. We have dedicated staff that are available for emergencies, strictly dedicated staff, but more importantly, we have staff that are trained up to handle a variety of emergencies.

We have something we call activation teams that are in place that rotate out monthly. When those folks come on board, they get trained every month. You know, it's not like you go on the

activation team, and, gee, I'm part of this team. Jennifer puts them through a series of training each and every month. When they come on, they respond and they're ready to go.

Those teams, I might add, basically get the center ready. As an activation center, they make sure all the equipment is up and running, make sure this piece of communication works, make sure these computers work. Are the files where they are supposed to be? Are they loaded up with the maps they are supposed to have? Everything gets checked on a regular basis.

We keep redundant types of communications equipment. We don't rely on just cell phones. Although, you will see that any of us that are part of the emergency response group always have this on and always have it with us. It rings occasionally. It's not the only thing we rely on. We have radio systems, those will be described to you, not just one radio system but two or three radio systems that we can use. We have satellite phones available to us that we can use.

In today's communication savvy world,

you know, too many people, I think, rely on one form of communication. It's important that you build up your redundant communication system.

Within the REOC virtually all of the information that you have been shown today is available by the click of a mouse or in hard copy in the REOC. You will see when you go downstairs several screens, I can -- if I want -- if I am in charge of an emergency and I want a drawing of the sluice at Norris, in a matter of a few seconds that can be brought up on a screen. It's there and it's ready to go. I don't have to guess, how is that made? Is there a special butterfly valve in that? What's in that thing? It's there and it's ready for me.

We do provide -- we do develop and provide plans and directories for -- I think we have 72 plans and directories that relate to 40 -- our 49 structures. Those would be the plans for the counties that would be directly affected by a dam issue, whether it be lots of water or a failure or a partial failure. We have those in place. We distribute those, I believe it's 72, Chris will correct me or Jennifer will correct me if I am wrong, because I haven't kept up with my notes here.

We develop emergency action plans also, not in a vacuum, but I believe it was Austin that asked about cascading effects, if something -- are there other dams and do they do this type of planning or do they know about their infrastructure?

Certainly they do. And, in fact, we develop plans in conjunction with those other organizations that have facilities in our region, Nantahala Power, Tapoca Power, Progress Energy, and a few other privates also or other agencies like the Soil Conservation -- well, it used to be the Soil Conservation Service, I can't remember the acronym

now, but the large ag dams, we know something about those, too.

Next slide.

There we go. So you're never on your heels in this business, but we do have three basic status types that we sit in. You have the probable event, the possible event, and it's happened.

The probable event you go on advisory status. An example of that would be flows are normal but you have got a lot of rain forecast tomorrow or it's cold and there's an ice storm threat.

Now, you know, how could that impact a dam?

Well, you have got switching issues. You have got emergency personnel. You have got to

get people to the dams to operate the dams sometimes, a variety of things. It gets into our dam safety and dam preparedness.

So you go on advisory status. You don't do anything else, but you let people know there's something out there that is probable, not highly possibly yet, but it's probable. Then you go into an alert status.

The reservoir is full and it's going to rain some more, more than likely. That means that

Jennifer and Chris and their activation teams go to the centers and they fire up the computers. They bring up the technical information, maps, whatever it is we need to be ready to go in the event that it does come to fruition.

Everybody that is on-call knows this is going on. You get a special call on your phone that you have to respond to. You're on alert. Don't plan on going to dinner with your family, it ain't happening. You be ready to go, is what that tells you. Then certainly activation.

The towers, 9/11, that was an activation. Nobody called for it. We didn't wait for Janet or Kate to say, do you think we ought to, you know, go on activation status, we ran to the center.

The Watts Bar hydro fire, we didn't wait for anybody to call and say, do you think we ought to activate, we went to the center. I will talk about that center structure in just a little bit.

We have something called an incident manager, and that incident manager doesn't have to wait for somebody to tell him to activate. They have not only the responsibility but the authority to activate, and that's happened more than once.

So here's kind of a structure. Remember, part of your planning is having your facilities ready or part of your preparation is having your facilities ready. It's having your tools ready. It's having your people ready and it's having a hierarchy put in place.

The key person in our emergency response, certainly everyone is important, but the key person, the one that keeps everything going is what we call the REOC incident manager, that's our River System Operations Emergency Management Center, the incident manager, that's the person that is the glue, the grease, the one that thinks ahead, the one that just can call up the troops, the one that says,

we need to go do this, we need to go do this, doesn't do it himself, doesn't have to be technically responsible for it because that person has technical managers at their disposal. They have got teams at their disposal. They have got dam the safety officer and the dam safety manager at their disposal.

They are the ones that make sure that an emergency response plan is activated, put in

place, that all of the calls are made, that the Bill Tittles of the world are notified or whatever local EMA it is or whatever state EMA it is, they make sure all of that happens. They are the ones that call order in the court when it's getting messy. They take care of that. They also have the entire activation team at their disposal. So it's a good process.

We practice this over and over and over again making sure that incident manager, more than anyone, knows his or her role.

Okay. Next slide.

We are also part of the National Incident Management System. That was adapted or put into place after 9/11. Part of that is the incident command system. That's been around for 20, 30, 40 years, a long time, but the idea here is for there to

be a common language spoken when there is a big emergency with many organizations involved.

We have adopted that language. Those of you that are in the emergency preparedness business knows what that is, but it's a good thing from the standpoint where you have a fire chief from here and a police chief from here and, you know, some emergency folks from here and they all have different languages, yet, if they are part of the NIMS and the ICS, they are all speaking the same thing and you can go through hierarchical commands. We are part of that.

Okay. Next.

Let's talk about the training a little bit. I talked an awful lot about the preparation in terms of plans and the buildings and the facilities and sort of the urgency, and I've been talking fast. Part of the reason I'm talking fast is when we're in the middle of an emergency, everything is happening

like this. You don't have until tomorrow. It's over tomorrow. A lot of times it's over in a couple of hours. You're now. You have to have everything done before it happens to know what you're going to do.

Let's talk about the training. This is part of the seriousness I talked about. We have

had 90 plus classes in the last five years. We have trained more than a thousand people in our emergency action plans and how we respond.

Someone asked or someone talked earlier about making sure we have the resources available that can respond and how do you do all of this, part of it is train, train, train, train, and it's not just a small group of people.

We have other training that's required, particularly at the plants. You can imagine why we have required annual fire training for our hydro folks. We have good reason for that. It happens.

We have incident command coordinator courses that are out there. We also do a crisis team management course, and those are at our plants also, because out there you maybe have anywhere from 3 to 30 people or thereabouts, depending on the plant, that have to understand all of these emergencies well and have to be able to lead an emergency until support can get in the site.

I should say too that we don't just train our own folks, we go out and work with the local EMAs and conduct local EMA training also, I believe.

Is that a true statement, Jennifer?

MS. JENNIFER DICKERSON: Yes.

MR. WAYNE POPPE: Okay. Other things. I mentioned my cell phone, and, yeah, it's on. Even though I am not on-call this week, my name is probably on there. Yeah, there it is. I see it.

I didn't show you this whole spreadsheet, but this is a spreadsheet that comes out each and every week. Each and every week you have to let -- if you're part of the emergency response, you have to fill this out by Friday at noon or my secretary or one of the others comes and says, why don't you have this filled out, I need to know where you're going to be, because starting Monday we change shifts of who's on-call.

So even if you're not the primary person on-call that week, you are part of this group of people. And this is just a small part of the spreadsheet, I might add. And I don't have the phone numbers on there. I didn't think you wanted Kate's or Janet's home phone number, which is why the phone numbers aren't on there, but they are on there.

That goes with you. In my case, I have a copy in my briefcase. I have got a copy in my car. I have got a copy in my office. Each and every

week that happens.

Also, you will see many of us that have these extra tags around our necks, these -- I have got all of our emergency calls and that stays with us. Anybody that's part of this response has these, and I think most of them wear them. Something could happen before I am done talking that we need to leave and run to. You can't wait and go look, well, where did I put those numbers and who do I call. I can't remember. You don't have time for that. Like I said, it's over usually in a couple of hours or at least a day. Just an example of what we do to keep up the speed and one of the little, simple tools we use.

Next slide, please.

We do an awful lot of exercises. Like I said, it's practice, practice, practice, and you do it over and over and over again. We have agency

emergency exercises. We don't have those as frequently as we do our individual river operations and river system operations environment exercises. We do also functional exercises, and we do those in cooperation with a lot of folks, with FERC.

Again, back to the cascading effects, Austin, I think it was last year that we simulated a

partial failure at Fontana, which would go through the Alcoa projects before it hit one of our projects. We had some of our folks over at Tapoco's emergency center working with us on that so that we could communicate with one another. How did the communications work? Did they not work? What did they know? What didn't we know? Did we pass along the right information? That's as an example of one so that you can deal with those potential cascading events.

We do training in cooperation with the Corps, as you might expect, and local EMAs also, and that's primarily Chris and Jennifer's job in terms of dealing with that, and they stay active on that.

We have monthly REOC activation team drills, I think I've mentioned that already. The activation teams are typically made up of a leader and several less tenured folks. The idea behind that is those with less tenure learn as they come along about our emergency response. They learn where everything is. They learn where all the tools are. They watch emergency responses in place so that after some time they can be the incident manager or they can be the technical lead. They are being trained under fire, if you want to call it that. It's a very

effective way to get many resources available up and trained.

We do special drills, like communication drills. I think I mentioned that the -- in the case of an emergency that you would get

a phone call. Actually, it's a computer that calls you. There will be a message on it, something called Dialogic, I think, is the software that we use. Jennifer will, without telling us, all of a sudden our phones will all ring within 30 seconds to see if that is working in the event that we had an emergency but she will say, "This is only a test," but she will see who responds, and then we get a grade, of course. So it's important that you respond. That's throughout RSOE. It doesn't matter who you are, you are expected to respond.

We do technological drills or technology drills. And again, it's can I call -- if I am sitting down here in the KEOC, can I call my maps up from Chattanooga electronically? Is the technology working like it's supposed to? So you test not only your people, you test your equipment that you rely so heavily on. It's very common.

Then, of course, we have the staff session drills and the table-top exercises. I

mentioned the one with Tapoco. For quite some time Janet and her direct reports around her table, we had Chris and Jennifer come in, I think, monthly to our meetings, and we simulated an exercise. In this case it was Blue Ridge Reservoir and playing the parts of the technical -- the various technical leaders and the incident manager.

The intent was you go through a section of it and what would you do, and then it's a discussion of, did you lose the dam or were you successful? What failed? What didn't you do? What should you have done.

So, in essence, everybody sitting around that table became trained at one time on the things that were done right or things that were done wrong. You incorporate those in the lessons learned

and you do it again.

Okay. Next slide.

So that's all really emergency preparedness is. It's prepare yourself, prepare your facilities, practice it, test it, do it again and again.

I specifically didn't get into the local EMA responses and how we work with them or the states or the Corps because that's what the gentlemen

are going to talk about after the break, I believe. Jennifer and Chris this afternoon, I hope you will take advantage of the tour, will show you the technologies and how things are brought up and they will talk a little more specifically and show you maps and which counties are recovered and why and that sort of thing.

I think with that, I will go to questions.

CHAIRMAN BRUCE SHUPP: Tom.

MR. TOM LITTLEPAGE: Yeah. It seems to me, not being a professional emergency manager, that if you look at things like 9/11 or Katrina, that most of the failures have resulted in interagency coordination or communications. You know, I think a lot of the agencies thought that they had a good handle on how to respond and it was that integration of activity that created the events that overwhelmed everybody.

What are some of the things that you have learned from those related to that issue?

MR. WAYNE POPPE: Specifically to Katrina?

MR. TOM LITTLEPAGE: 9/11, I guess, we thought it was equipment kind of stuff, we didn't

have the right equipment. Then Katrina came along and kind of --

MR. WAYNE POPPE: I think with 9/11 or

with any of the others, one of the major issues becomes, are you talking the same language, which the effort with NIMS is to start talking that same language.

There are some other lessons learned that have been put out there by some of the companies and agencies that were affected by Katrina more so than us, but certainly cell phones was a major issue and their inability in many cases.

I don't know, Mike, do you have any specific lessons learned that the Corps has?

MR. MIKE ENSCH: Prepositioning. Some issues about prepositioning of supplies, materials, command centers, some of the utilization of DOT assets that were -- the coordination there wasn't as good as it could have been definitely.

The communications, cell phones just absolutely did not work. Sat phones, the problem with Sat phones is you had to stay in one location, you couldn't be moving.

We used the navigation industry and we put one of the barge folks in our command center to

help the coordination with getting the systems back open, and that was invaluable. So there's -- you know, there's a good litany of those out there, and now it's a matter of can we apply them.

MR. WAYNE POPPE: As you might expect, Tom, all the things that you could hope would work, you are working in an unnatural situation or outside the norms, so that's why it's important you have the redundancies built in. I think that's part of the answer is built-in redundancies. I think that's been known but maybe not used as effectively as it could have been.

CHAIRMAN BRUCE SHUPP: More questions for Wayne?

Thank you, sir. Good job. Appreciate

it.

We're going to take a break, but before that, I want to remind you again that there are still some people who have not notified Sandy if they're going or not going tonight. If by the time we're done here and start our tours, you haven't notified her, you won't be accommodated. So immediately following the break, see Sandy and let her know if you're going to supper or whether you need transportation.

So let's take a break for -- until 2:30.

(Brief recess.)

CHAIRMAN BRUCE SHUPP: Take your seats, please. All right. To continue with emergency preparedness, Gary Brock is going to lead this next session for the next hour, and he will introduce his speakers as we go.

Gary, you have got the whole deal.

MR. GARY BROCK: Sure. Well, we've just heard about emergency preparedness. Well, we can do our part, but we can't respond to emergencies completely on our own. We have to rely on partners and other folks, both at the local level, state level, and at the other federal agency levels. So we can't do this by ourselves. We need assistance and help in doing so.

So we're going to have three folks talk about coordination with us and what they do. The first will be one of the Council members, Mr. Bill Tittle. He will give us a perspective from a local perspective. We have Jere McCuiston who will talk about from a state perspective. Then last will be Mike Ensch that will talk about Federal or Corps and TVA coordination efforts, and it will be a

broad-based thing, I think.

Anyway, I would ask for y'all to write

down your questions for each of the speakers and hold those until the end and then we will let them answer those, if you have any, at the end of the session.

With that, I would ask Mr. Tittle to come forward.

MR. BILL TITTLE: Thank you, Gary. You know, I watched the turbine story, it reminded a few years ago when you were retrofitting the turbines at Chickamauga. They called me and the paramedics, rescue paramedics, other rescue people, fire folks, and took us down into the dam in case one of the workers fell. TVA does a good job always thinking of safety preparing for contingencies. In case someone fell, they wanted us to know how to get down to rescue that person and get them out of there.

We were way down in the catacombs. You know, the turbines are right at the water level and then the big fans are way under the water. Well, if you fall below those turbines, you can imagine how deep we were in that dam.

I had heard a lot about concrete growth and we get way down there, it's dark and it's kind of slimy and it smells like fish, and the water

was leaking a lot and we had heard all of this about concrete growth and we were a little apprehensive down there.

I asked someone, I said, "What's the life of one of these dams?"

And he said, "Oh, about 50 years."

And I'm thinking, this was dedicated in 1939. Let's see. Thank goodness no one fell and we never had to go back in there. Y'all did a good job.

I wear two hats. I am Chief of Emergency Management in Hamilton County, and then I'm also the Coordinator for Homeland Security and counter-terrorism activities in a ten county District

3 homeland security area in Southeast Tennessee. Knoxville is in District 2 and the three cities up in East Tennessee or Upper East Tennessee are in District 1. Then we go all the way across the state with 11 districts.

So I wear two hats. As I say, when we talk about infrastructure security for TVA, a little bit of each of those hats will come out in my comments today.

We have had a long standing relationship with TVA in a lot of areas. We work

with river operations. I was just teasing Chris that the next time it's going to rain a lot, we don't care about keeping reserve for hydro, just bring that lake all the way down to the empty level, Chris, so we don't have flooding in Chattanooga.

We work with the nuclear people. In order for Sequoyah to have an operating license or any of the plants, once every two years we must demonstrate to FEMA and the other federal officials that we have a good protection plan for the citizens who live within the 10-mile radius around one of those plants.

So we have a big staff of folks who volunteer and other agencies who help us carry out that notification, evacuation plan, along with the state emergency management folks from Nashville. So we work with TVA in that regard.

Then when it comes to other security issues, I work one removed with TVA for that. Most of the activity is with our local law enforcement, state law enforcement, and federal law enforcement agencies. I talked to each of them before I came up here to talk with you today to make sure that I didn't say something that wasn't true.

I talked to the folks at TVA over

three of the nuclear plants. I talked to the CID,

Criminal Investigation Division folks, to make sure that their interaction with all of our local folks in Southeast Tennessee was adequate, and they assured me that it was. I talked to the local Sheriff's Office, the local police department. I talked to the folks at the FBI. I talked with the local jurisdiction who has the immediate responsibility, Soddy Daisy Police Department, I talked to their chief, and they all said their relationship was better than good, that they worked with all of these other folks to coordinate the security around that particular nuclear plant.

We have other concerns. In District 3 we have three of the dams on the Tennessee River. We have Watts Bar, Chickamauga, and Nickajack. We also have some of the dams on the Ocoee and that water system, the flume, and all of that up that way.

The Raccoon Mountain that you mentioned today, that's in our area. Someone in the last talk -- I think, Wayne, you talked about the River Operations Center that's below the dam there underground, and then we have, Kate, the big Power Operations Center in the basement of TVA complex downtown.

So we have a lot of TVA infrastructure in Hamilton County and in District 3, and we try to pay a lot of attention to that in our emergency planning.

The other thing that I wanted to talk about. We have four areas in emergency management. We work about -- worry about mitigation or prevention. We try to work on preparation and planning, and then we do actual response, and then recovery. If you think about Katrina, they are in the recovery stage down there.

Then it's full circle. Then we go

back and think, what did we learn about that incident? What can we do better? What can we prevent? What can we mitigate?

We have an all-hazard plan. We talk about earthquakes, we worry about that. We talk about flooding, and that's the No. 1 issue and the No. 1 hazard that we have in Southeast Tennessee.

Terrorism is just another hazard, and you say how can that be?

Well, think about the preparation we did for small pox when we thought the small pox was coming our way, and that's a terrorist incident. Now think about Avian flu and the preparation that the

agriculture and health department are doing for that, it's very similar. So in many ways terrorism is just another one of the hazards that we have to prepare for, whether it's an explosion, chemical or biological or any other type of event.

I mentioned District 3 homeland security, I think the good thing that has done, it has brought a lot of the agencies together in Southeast Tennessee to help it support each other so that our response group, if something happened at a TVA facility or any other facility, we have a lot more people to respond within this district.

We have equipped a lot of these folks with better equipment, with better testing equipment, with better personal protective gear, and I think we're much better prepared to respond to that.

It a good question that someone asked, what lessons have you learned post 9/11?

Certainly, communications was an issue. We have learned that even the firefighters and the police in those two buildings really couldn't communicate very well with each other. So a lot of attention and a lot of money and a lot of effort has been focused on improving communication, hardware

communication.

A lot of agencies couldn't speak with each other because they were on different frequencies, and we have done a lot throughout the State of Tennessee, and I can only speak for Tennessee and Hamilton County, but we have done a lot in the State to improve our communication capabilities. It isn't just radios and it isn't just frequencies, it's talking to each other. It's relationship between agencies.

We're fortunate in my local county, because we have been doing that for a long time, and one reason that we have had to are things like the Sequoyah Nuclear Plant exercise that we have to do every couple of years. It forces us to work together. It forces all of us to read our part of the plan and understand how we interact.

We also have a big air show every two years, that forces us to get together and prepare for 80 or 100,000 people around the airport. Then we have other big festivals on the river that you have probably heard about, Riverbend, and we have up to 80 or 90,000 people in a totally uncontrolled area down on the river serving beer and advising them to have a big time. So that's an issue and event that causes a lot of our folks to work together also. So we

learned about communication and we learned to do a better job.

Post Katrina what did we learn?

When you're in emergency management you're not very quick to criticize other areas where they have a problem because you think, you know, boy, did we dodge a bullet that it happened down there and it didn't happen up here.

When you look at Katrina, I think one of the big things that we learned from that, and I'm quoting Jim Bassham, who is the Director of Tennessee

Emergency Management Agency, General Bassham says, "We need to do a better job managing our expectations."

Now, think about that. We need to know what we expect the state to do for Hamilton County. We need to know what we expect TVA to do for Hamilton County. TVA needs to know what they expect us to do at the local level and what they expect the state to do. We need to know what the other federal agencies can do for us. We have had meeting after meeting and we have talked about those expectations.

I think we already had a good understanding of that in Hamilton County, I think we already worked well together, but I think after

Katrina we revisited that. We learned that we didn't have shelters for a lot of people. We sheltered 120 people off of one airplane and we had to open a recreation center. Our normal shelters that we use for flood victims weren't large enough, didn't have enough showers for people to stay night after night.

Normally floods victims will stay a day or two in a shelter. They want to get the heck out of there. They don't like those cots in a gym. They go to momma's house or Aunt Susie's house or go get a motel or they get out of there until they get back home. The Katrina situation was different and we learned some things about that.

We also are concerned about public expectations. I think we spoil our public. We saw today with this emergency upstairs a fire engine respond. It probably got here in two or three minutes after that call. EMS responded. Then I saw another truck from rescue or somewhere. We spoil our people.

In Hamilton County we have 23,000 emergency ambulance calls each year, and our average response time is eight minutes. We only have 14

ambulances in the whole county, but the average response time is eight minutes or less. Fire and police, about the same thing. Fire, maybe a little quicker because they have more stations out. We spoil the public.

If you don't think that's true, think about Wilma moving across South Florida. People coming out of half million dollar condos to get in their Mercedes. They couldn't get gas. They didn't have any water because they didn't heed the three or four day warning that they had to go buy some water and fill up their car before the storm hit. They expect, well, the storm is over and I want everything to be back normal again. So we have still some territory to cover to get the public to do a little better preparation.

What is our biggest single concern? Our biggest single concern is restoring the central services after something happens, and electricity is very important to that. So many things that we depend on operate off of electricity. So that's a major concern of ours.

So assuring that TVA has power to supply the Electric Power Board in Hamilton County is very important to us. Working with power board is very important. So central service restoration is a high priority for us.

Our concern too is surge capacity. It doesn't take too much of an event to overwhelm local capabilities. If you think about hospitals, if you think about shelters, if you think about any of the needs that we have, we're an economy that runs on supply and demand. We only have enough supply to just barely fill the demand. That's good business. You don't want to have oversupply because that costs money.

Very quickly, we can overwhelm the

hospitals that we have, nursing homes, doctors, other facilities with surge capacities. So all of us are very much concerned about that.

I could talk about a lot more things that we do, but I don't want to step on the state folks from Kentucky and then the federal folks.

I'm happy to entertain questions after the other two speakers.

MR. JERE MCCUISTON: Good afternoon. How are y'all today?

I'm Jere McCuiston and I am from Kentucky Emergency Management from Hopkinsville, Kentucky. I want to give you a little idea on the state side. Bill has talked to you about the local side or the county side, and so let me talk to you a

little bit about the state side. We're going to talk about Kentucky, not Tennessee, so it's a little different.

We have a mission statement. I will let you-all read that. I am not going to sit here and read it for you, but as Bill said, you know, we're looking at all hazard approaches. We're not trying to do it just for one thing. We have to look for it all. So our mission statement says, "It's an all hazard approach that we're going to do."

Now, when you go to talking about all hazards, here you have got your hazards, natural, transportation, national security, infrastructure, you know, you can look at all of these things. These are things that happen.

I didn't know whether I was going to make it down here this morning or not because there was a weather front coming through West Kentucky that was dropping about 2 inches of rain and we were having low level flooding in several places, but, thank goodness, it broke up and I was able to make it down here.

Since last -- well, Katrina happened on the 29th of August, on the 30th of August in Hopkinsville, Kentucky, we had flooding there. That

took about a month of my time to work on the flooding. On November the 15th we had a tornado to hit Marshall County, Kentucky, and Hopkins County, Kentucky. The guy that was in Marshall County had retired. So I was covering his area as well as mine. So I had two areas that I was working tornadoes. Then about a month in Hopkinsville, again we had not a tornado, not flood, but this time we had wind.

So in the last six months I have had four major catastrophes or whatever you want to call them, but, I mean, besides trying to do the regular things that we normally do.

Now, what does emergency management do?

On the state side we operate an EOC in Frankfort and TEMA has theirs in Nashville. All right. This is a 24-hour warning point. Our duty officers last night were calling all the counties and telling them, hey, you have got bad weather coming. It depends on what the national weather services told them, whether it was a warning, a watch or whatever it was.

In our -- on the Kentucky side we have 14 individual offices. In Tennessee y'all have it as three regions and then it's broken down into offices

that way.

We do coordinate state -- I mean, search and rescue. And then, of course, we're responsible to keep up with the state emergency operation plan and to check on and make sure that the local plan works.

If you get to talking about the State of Kentucky, Area 2 is my area. You wonder, what can go wrong in Area 2?

Well, you have got -- down here you have got Kentucky Dam. Y'all know where that is. Next to it Barkley Dam. Up here -- over here in Muhlenberg County you have got the Paradise Steam Plant. You've got down here in Christian County a little old place called Fort Campbell, you know, it's a little military base.

There's no telling how many transmission lines that your electrical company has. There's no telling how many underground oil and natural gas lines that are there. We ruptured one on Thanksgiving -- the day before Thanksgiving in North Hyde County.

We have got two major lakes here. I mean, two rivers coming in, the Cumberland and Tennessee. You've got the Ohio up here. Livingston

County, a little town called Smithland, and he'll talk about it in a minute, we have major flooding there whenever we have large rains.

I don't have a whole lot of people in my counties because we're rural. Probably, Bill, your population for Hamilton County is probably what my nine counties are made up of, but we're scattered out. When I have a problem I have to determine where the state resources need to go and I have to know what the county resources are.

Now, in your packet I have given you three additional sheets that I don't have up here. It shows on there emergency manager's check sheet, a response sheet, and then it has a suggestion for an operations kit.

When I start somewhere I should have done all of these things before I start making a response. I need to make sure that these thing are done. You know, this is planning, planning, planning. The response, when we get there we have to

make sure we have an EOC, comply with NIMS and all the different things there.

Emergency management is more than just showing up whenever there's a fire or something. It's something when it's a disaster. So just to give

you an idea of how big a job we have.

Now, if we go into special programs, in Tennessee you have got the nuclear programs. We have the nerve gas up as Richmond, Kentucky, the CSEPP program. Sensitive material movement, that's the radioactive shipments that are moved through the State of Tennessee and Kentucky both.

The EMAC, and this is where we send -- I have been down to Alabama and we have sent them to Florida. We send our emergency management people to help other states. If we have something to go wrong in Kentucky, Tennessee and other states will send help to help us.

And then the last thing is community crisis response, this is debriefing, critical stress debriefing. Whenever we have something to go on, we have to bring the debriefers in. These are a lot of times mental health people and professional people, and they come in and help to take care of the stress and relieve our volunteers and our workers. We forget about these a lot of times.

Everything we do on the Kentucky emergency management side, the biggest key to it is to communicate with other agencies and other people, and we're having meetings after meetings. I told

someone the other day we'd have meetings to plan meetings, but we're trying to meet with law, fire, rescue, ambulance, mental health, health departments, rescue squads, and we're doing it on a local level in the counties and we're doing it area wide. That communications bill, that's the key to it when something happens, that you go out and you meet

somebody at 2:00 in the morning and you have seen them somewhere else.

Thank you. I appreciate being down here today, and I hope this has helped you out some.

MR. MIKE ENSCH: We're going to swap over some slides here, but one thing that I wanted to mention real quickly, we talked earlier this morning about Barkley and the lake level issue there. I just wanted to let you know that the -- from the Corps of Engineers' perspective, and this is something Kate had mentioned, we have an Environmental Assessment that is out on the street for review right now.

The determination will be made once that Environmental Assessment is completed whether or not to proceed with the findings in those significant impacts and perhaps investigate some of these lake level changes that are being proposed or do an Environmental Impact Statement. That EA is on the

street. It closes the first week of June, the comment period closes the first week of June.

I would envision perhaps sometimes towards the end of June having a determination on whether or not what -- which way we're going to proceed. I don't want to falsely influence any perceptions right now by saying one way or the other, but it's just open for comment now. Comments will be welcome. The Nashville District home page for the Corps of Engineers has a link on there for that assessment.

And also, Austin, I will provide you and get you a copy of that later on when I get back to the office.

One thing that Bill had mentioned, you know, about coordination and emergency services coming out, I can really relate to that. We were at Wilson -- I was at Wilson lock yesterday. We're having a major dewatering there. It's one of the

bigger chambers you will see anywhere, about 100 foot lift on that lock, huge gates.

We had the emergency services guys come out. If one of our folks gets hurt down on the lock floor, you know, how are they going to respond? Where are they going to come? Does a helicopter come? We did do all the preparation.

We're taking a look down in the valve chamber from the top of the lock wall and we're looking down in there and the emergency -- the EMS guy is standing beside me and I am looking down there, and it's a long way down. There's a pipe that runs all the way down and you can hear the water running and dripping down there.

I just kind of looked down and I said, "Well, now, what's going to happen if I fall in there?"

He never looked up and he never blinked, he said, "You're going to die."

Okay. Case closed, you know, somebody will get me out of there at some point time, but it's coordination, that's what you need. That's what you need.

MR. BILL TITTLE: It's called communication.

MR. MIKE ENSCH: Communication right there. I am going to deal a little bit with emergency response towards the end of this, but what I want to do right now is talk about one of the best, if not the best, partnerships in the federal government.

I have been working for the federal government for about 30 years, and I can assure you that the relationship that Army Corps of Engineers and the Tennessee Valley Authority has is unparallel in the federal government. We do things together. It's like twins. We do things that the other

anticipates doing and we will already be calling those folks saying, hey, do you think we ought to. It is a great working relationship.

Navigation is our primary focus, but we also work on hydropower, water resources, development and the like. It is a great working relationship, and I can assure you from the tenure I have had with the federal government at a few different levels, there are certain agencies out there, there's agencies in one department that I won't name by name, but over in Interior there are agencies that don't even talk to each other and it's amazing. So our partnership is just wonderful.

Let me very briefly give you a thumbnail description of the Corps of Engineers' Nashville District. Our basin is about 59,000 square miles. Our activities are primarily focused on the Cumberland. We have ten projects up there, many of them are main stem and tributary projects, exactly

like Janet explained this morning. We have nine hydropower plants, four locks up there, and ten flood control projects.

We also operate and maintenance on a day-to-day basis the navigation facilities on the Tennessee River. We do that in partnership with TVA. We do that for TVA, but that's kind of the Nashville District.

As I said, it's a wonderful partnership. The Corps of Engineers predated the Tennessee Valley Authority. We were in the region doing water resources planning when TVA was created. Everything that we had accomplished on the Tennessee River went straight into TVA and they assumed that responsibility, and we refocused our role to navigation.

As it shows, what Kate mentioned this morning, we have an MOA that was initially prepared

in '46 and was updated in '62. It probably doesn't need another update. It gives very distinct authorities and responsibilities for each agency. We know that and that's how we work. That's how we live.

The Corps' role, like I say, has been redefined to navigation. We meet annually to talk

about budgets, what the Corps is anticipating for next year, what TVA anticipates doing, and then here in a moment I will talk a little bit more about other meetings that we have, but it's a great relationship because if one agency can't get it done, the other agency probably can. And if perhaps not, then the two of us together will get it done.

Again, if you're thinking about -- I am saying what a great partnership is. You wonder why I don't have the TVA flag in the other position, I will just say, this is a Corps presentation.

Partnerships, here's the roles and responsibilities for each agency. On the left-hand side of the screen, what you see is primarily the day-to-day activities. That's what goes on on the river on a day-to-day basis pretty much. TVA is responsible for the overall project. They own the capital facility. They improve the capital facility. We do the day-to-day stuff.

One of the things that I would mention, the middle bullet on the Corps side, issues permits for structures in conjunction with TVA, we have both our 404 Regulatory Permitting Program, TVA has Section 26. Our folks work together hand-in-hand with the regulators and TVA to closely collaborate.

We don't want to put a burden on the applicant from one agency to the other. So it's a great working relationship. We deal with who is the primary responsibility and who is the secondary, and they do that on a day-to-day basis and it really

works well for the applicant.

The team that we work with, from Kate to Janet to Gary down to the folks on the river, it is an absolute fascinating team to work with. We talk to each other on a daily basis. We have quarterly workshops. We get together and sit down on a quarterly basis saying, what's coming up, what's the next big job and how are you going to do it?

TVA perhaps will funnel money into one thing and we may do the design. We may have the money to do it and not have the wherewithal to accomplish it. So we send that money to TVA to get things fabricated, designed, bought, whatever the case may be. So those quarterly meetings work out well.

We have semi-annual navigation meetings with all of the partners on the river where we both sit down with industry, other organizations and plot out the year in advance and the next year that's coming up.

Our dollars can augment each other. We have a federal appropriation on the Tennessee River. TVA works with the funds that they have available. And again, like we were talking earlier, mooring cells, TVA has done the design, the placement and the acquisition of materials for some mooring cells in Decatur, Alabama. We're going to be putting those in as soon as the Wilson dewatering is completed.

So it's a great -- it's a great working relationship. Interestingly enough, if things happen on the Tennessee River, if we have a tow bump a gate or if we have something go wrong typically, I hope, I am the first phone call, TVA is the second phone call, there's no doubt about it. TVA engineers respond. We get the navigation folks

on the river involved with it. So from that perspective, we do day-to-day activities very well.

I mentioned the Wilson dewatering. We had a joint inspection team. The TVA folks are still over there. We're taking a hard look at that project. It does need a lot of work, but we work hand-in-hand. I send a letter to Janet and say, hey, we're going to plan the inspection for this big dewatering on such and such a day.

Her folks get prepared. They come over. We have equipment that they may not want to bring with them. We go jointly down into the projects. Our folks know these things backwards and forwards, I would say.

One of the great outcomes of our partnership recently has been the Tennessee River Waterway Management Plan.

How do we deal with the river -- it's been mentioned earlier today, how do we deal with the river either in times of drought or in times of high water?

We have a -- working with both TVA, the Tennessee River Valley Association, the Coast Guard, the Corps of Engineers put together this brochure. It's that reference material that the emergency management folks talked about that you can go to this management plan and say, okay, the river is going to be at this level. We anticipate this activity and here's the phone tree. Private companies, shoreline development, other folks that need it, we will have daily phone calls, sometimes twice daily phone calls on what's going to go on on the river.

The shippers say, you know, I think I

can still traverse this particular area and we will talk about it and see what the flows are going to be and see what the anticipated flows are going to be,

but it's been a very, very positive plan. It optimizes navigation during periods of poor conditions. Timely and coordinated communications, once again, the communications piece being key.

I'll talk very briefly about Barkley. Barkley is in Kentucky. As you see, the Barkley Canal connects the two lakes. So they have to be managed in tandem. One lake cannot be at a higher level or maintained at a higher level -- appreciably higher than the other.

Our waterways -- waterway management folks call daily to TVA. TVA calls back with, what are you going to do at Barkley and what's your anticipated inflows? What's ours on the Cumberland?

TVA's modeling is probably better than ours at the moment. We use the TVA model to predict river conditions. So outflows from both Kentucky and Barkley are regulated on a daily basis.

Interestingly, what's important here too is not only does it cut off -- if you're going from Nashville to Decatur, say, it cuts off 66 miles in two locks, but the real key to this complex right

here is if you come straight down Kentucky Lake you end up on the TennTom. It's the doorway to the TennTom, and it's critical to folks using the Mississippi and the Ohio River. So the work around here, the scheduling of the water is very important.

One thing that the Corps of Engineers does do, in times of flood our Cincinnati office takes over the control and the releases from these two projects. At that point in time, they're taking a look at what's happening on the lower Ohio and the Mississippi. The Cairo gauge down near the mouth of the Ohio is the controlling factor.

So our Cincinnati folks, working in tandem with TVA and Nashville, regulate the flows from both projects. At that point in time, our

regulation or our outflows for hydropower and for navigation are superseded by the criticality of the flood control projects. So that's how that is operated at that point in time.

Emergency management, we can talk a lot about the different things. You know, Jere mentioned some. Bill, you know, very explicit in what happens when these events occur. Training is one of the greatest things that we can do. We work hand-in-hand, again, with TVA.

Just a couple of years ago we entered into an agreement where if one of their dam operating crews is working at a project and they need to make an emergency change at another dam where maybe that crew can't get over there, we're training our lock folks to operate the gates on the TVA structures. That hadn't happened before.

It took a little bit of doing, but it was the right thing to do. It's the smart thing to do, to where those folks that are working at Tims Ford, we can have our guys at Chickamauga making a change perhaps, if that's what's necessary, and that's a great opportunity between us.

We do joint dam safety exercises. We did an exercise a couple of years ago at Center Hill where we had -- where we had an issue with Barkley and TVA participated, the Weather Service TEMA, Kentucky Emergency Management, other folks who are partners in any emergency discipline. So you do those exercises and you learn from them and then you recapture the lessons learned.

It's like what was mentioned earlier this morning, Taum Sauk, Taum Sauk flowed into a Corps of Engineers' reservoir. All of our activity that day was figuring out -- and there were three or

four districts involved helping Little Rock out because it was a Little Rock project that that water

was flowing into, helping them figure out, what's the impact of that water, how much is it going to affect the level of Clearwater Lake in Missouri and can the dam withstand it or do we need to make changes in our operating procedures, do we need to get people out of low-lying areas. So those are the kind of things that help everybody work together in times of an emergency.

We talked a little bit about 9/11. Security is a critical factor at our locks, the locks that we operate, both on the Cumberland and down on the Tennessee. TVA has taken steps to provide secure barriers, fencing, lighting and other things at the looks that we operate. We have usually 24-hour folks there. We work in tandem.

If we have a security alert, if the alert level changes, we first talk to each other about what's going on if you alert level changes, how are we going to change our operations and do TVA police need to flow to one area or another and how are we going to continue to operate the projects. So, again, it's a tandem operation. I think it's very good, very beneficial.

As Gary had said over lunch, and he really did capture it, with the two agencies, Corps of Engineers and TVA working together, the taxpayer really does get absolutely the best deal for the dollar, and that's kind of the thought I would like to leave you with.

I would like to offer one little test for the folks around here, and it deals with this. Now, typically y'all know what this is, but, you know, why does this -- why is this in a TVA/Corps of Engineers' partnering presentation?

Well, for one thing, we both manage the river and we both put up with the Vol Navy when we have to, but what I am really, really proud about

is the way TVA has remained a silent partner in one aspect of this.

Do y'all know why the stadium was named as it is?

It was named for the National District Engineer, Bob Neyland. I understand that he coached a little football in his time also. We do know that when he worked at Corps in Nashville, he worked over there Monday through Thursday, took the train on Thursday afternoon, came over to Knoxville, coached a little ball and then went back over to Nashville on

Sundays.

Now, I wouldn't have known that. See, I'm from the Big 12 and I don't really pay attention to minor conferences, but --

MR. TOM LITTLEPAGE: Somebody is going to be coming for you.

MR. MIKE ENSCH: I just wondered if y'all knew that little fact. With that, I thank you very much for your attention.

CHAIRMAN BRUCE SHUPP: Gary, you have the floor back again, right? You're going to coordinate the questions.

MR. GARY BROCK: Oh, well, sure. I never miss a chance to stand in front of a mic.

Okay. Do we have any flags up for any questions for Mr. Tittle?

MR. TOM LITTLEPAGE: I will ask a quick question. The reference to this Tennessee River Waterway Management Plan, is that your guidance plan and does that implement the ROS changes or is there another plan, sort of a master manual for the system and this is just coordinated with it?

MR. GARY BROCK: The Waterway Management Plan was developed prior to the river -- the ROS, and it specifically addresses navigation

issues on the Tennessee River System. So it's

specifically for low water events and high water events, what do you do, who do we contact, that type of information.

Kate, I guess the best place, the ROS is the final EIS.

CHAIRMAN BRUCE SHUPP: Any more questions?

Okay. Thank you. Good job, Guys. Excellent, everybody. Thank you.

All right. Now to bask in the glory of her staff and to summarize the day's presentations is Janet again.

Janet.

MS. JANET HERRIN: Before I do what you suggested there, there was one question we took an action on, and I believe -- Jimmy, I think it was you or Austin that asked about our expertise -- our seismic expertise particularly when we got started back in the 1980s.

We went back and researched that, and in 1980 when we did start looking at the seismic work, we were doing that in-house. We had our hydro Board of Consultants and we had a particular gentleman on the hydro board who was an industry

expert in seismic evaluation.

As we went through the 1980s we got overwhelmed, quite frankly, with a lot of nuclear work that was going on at that same time. Obviously, there's a real interest in the seismic impacts when you're designing nuclear plants. So at that point we did go outside and we hired Harza Engineering to do some site seismic analyses for us, and that's how we proceeded through the rest of the 1980s, on a site-by-site specific basis.

We realized in the early 1990s that we needed a more area-wide look. We couldn't look just at Kentucky Dam, at Pickwick Dam, that we needed to

look at the seismic impacts across the region and then apply what we learned from a regional perspective to each one of those dams so that we were consistent across the dams.

So in the early 1990s we had Harza do a Valley-wide study for us. It's very similar to the restudy that we did in 2002 that Gary talked about, mentioned that we're doing now with Geo Matrix, who are now serving as our seismic experts.

So I think that's the long answer to say that we are very much depending on outside expertise for the seismic analysis, outside

engineering forums to help us evaluate the seismic information that we have in this region.

So does that answer the question?

Okay. Well, I have to say my summary will be short because Austin stole quite a bit of my thunder. Right after I spoke, he said -- I think you said something to the effect, gosh, that's an awful lot of stuff that you guys have, a lot of

infrastructure that you're responsible for.

So I will save you going back and reiterating my speech about all of the infrastructure because there is a lot of infrastructure out there that TVA is responsible for; and that is, infrastructure maintenance and improvements that was funded in the past primarily partly by appropriations or wholly by appropriations.

We talked about all of that infrastructure and then we talked about the things that we do, the testing, the inspections, the maintenance, and then the long-term projects that we do to address those -- that infrastructure. We talked about our issues with seismic. We talked about issues with concrete growth.

Then in the event that all of those

things don't happen just exactly like they are supposed to, what do you do to respond in the event of an emergency, we talked to you about that. So why do you-all care about all of that?

I realize that you-all can give this part of the speech too, but I'm going to run the risk of just reviewing the benefits that that system that we discussed provide to you today.

On an annual basis there are real money, real dollar impacts of about $2 billion annually from that infrastructure. You get about $200 million annually in flood reduction benefit. You get about $1 billion in benefits on navigation. About half of that is because we have the river and it is less expensive to transport goods on the river. That, coupled with the fact because we have the river, the rail and the truck rates are lower than they would be in the absence of the river, that's a $1 billion benefit on an annual basis.

We also have the hydropower production. In a normal year, and again, you know why I use that term loosely, that's about 500 or $600 dollars. Then I am not even going to try to quantify all the recreational visits, the value of the economic benefit of those recreational visits. The good water quality, the water supply, those are all, I would say, pretty hard to quantify. So I will leave that up to you.

The bottom line you heard Bill mention, design life, when engineers go in to work on something, there's always the design life associated with it, but I think the good news with our system, the integrated system, is with appropriate attention through our inspections and our maintenance and our long-term improvements, this system can stay in place and continue to deliver those benefits long into the future. We're not talking about decommissioning any

time soon if we continue to maintain.

So I look forward to your input. We're going to ask you some questions. I think Dave is going to review those questions about some of the things you heard today, where we have opportunity for improvement, we're very interested in your perspective on that and we look forward to your response to those questions tomorrow.

Thank you.

CHAIRMAN BRUCE SHUPP: Questions for Janet before she leaves?

I have one that I asked one of your staffers and they said, "Ask Janet."

MS. JANET HERRIN: All right. Who was

that?

MR. TOM LITTLEPAGE: Now you have done it.

CHAIRMAN BRUCE SHUPP: You must have modeled a worst-case scenario for facility failure. What does that look like? On a worst-case scenario what would happen to the system if an upstream facility failed?

MS. JANET HERRIN: The answer that I am supposed to give to that is it's not a good idea to speculate what could happen.

I think, you know, what I worry about most is a rainy-day failure of one of our upstream very large tributary reservoirs and that wall of water coming downstream and that cascade. I think there was a question about that cascading effect all the way downstream. We have modeled that. We have an idea of what that will look like.

We work very closely with the local, the state emergency management agencies so that we're prepared to address that situation, but every emergency I have ever been involved in, when it comes, all bets are off. You have trained and you

have got a good sense of what to do, but you do what you have to do to work your way through that.

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That cascading will come down through the system and we will just be working our way through very closely with all the local and state emergency management groups to address -- to get the people out of the way, that's got to be the first focus, you have got to get the people out of harm's way, and then address the recovery after the fact.

Yes, we do go through and we look at a sunny-day dam failure, that's out there, and there's something structurally that happens and we have a problem with the dam. We also go through and look at a failure on a rainy day. We do flood maps so that we understand the extent of that failure downstream. We share that information with the local emergency management folks and plan for those scenarios.

CHAIRMAN BRUCE SHUPP: Would an upstream failure suggest that downstream structures would go also? I'm not talking about just flood damages, but would the structures stay in place so that recovery could come faster?

MS. JANET HERRIN: It depends. It depends on what goes and under what circumstances it goes. Again, as we model it through, we know what to expect.

If we go out there and look -- for

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instance, if we were to have a failure at Fontana, we have worked with Alcoa. We have talked to them about the four projects there and what would happen there. We have got a pretty good idea of what to expect on downstream and where those failures would come and what we would do.

We will contain it obviously just as fast as we can, but we're going to do our best to open up the gates and get it moving through so that

we have the least amount of damage also.

CHAIRMAN BRUCE SHUPP: I understand that.

Austin.

MR. AUSTIN CARROLL: This is not -- a little bit off the subject, but something Gary and I were talking about at lunch. You know, when we were talking this morning and we were talking about how much water is spilled at these dams and then we were talking about, you know, 100 days or two or three months or whatever, I mean, spilling over a dam and not going through a generator, that makes --

MS. JANET HERRIN: That can be a good thing.

MR. AUSTIN CARROLL: I know, but if it went through a generator even though -- I mean, at

Kentucky when you spill, I mean, we've lost that forever, I mean, there's nothing, no generators down from that.

So, I mean, is it not feasible to put in generators at those locations to try to generate some more electricity?

I mean, even if you had to divert it, you know, like you do on some of the upstream dams, divert it, I know it's pretty difficult to put a generator in an existing dam structure, you know, but if you could divert it downstream where you had a generator down there, you know, somehow or another, is that not feasible?

MS. JANET HERRIN: The project planning folks at TVA are always looking at ways to increase the power generation. Over time we have looked at installing generators at non-power

projects, and to date it has not been economical. The prices have not been such that that makes sense.

Now, that could be very different as

we move into the future, and those things are always on the table and always looked at and there's some discussion.

When we built Raccoon Mountain, there were other pump storage sites that were considered.

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A private company has come into the Valley and looked at a pump storage site, those might become economical in terms of power production someday also, but that's a group that's in another part of TVA that's looking at all of those, do you start another nuclear unit, do you build some type of renewable generation, do you add generators to existing hydro plants, do you add generators to non-power plants, all a part of that planning process.

MR. AUSTIN CARROLL: You know, it just seems like to me when there's no fuel cost, very little operational cost, you have only got capital cost, the --

MS. JANET HERRIN: Be careful with that no fuel cost.

DR. KATE JACKSON: Let me add, the amount of time that you are spilling over and above what you can generate above whatever your efficient generating load is, so you're generating at maximum sustainable load and that drives additional costs because of habitation over time if you were to generate that, once we get to that maximum sustainable load, then we spill if we have to.

The amount of time that you're spilling that water is a very small amount of time.

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In addition, it's typically on days which are overcast, not a lot of power demand, probably not a lot of interconnect demand. The value of that power is relatively low.

Now, of course, we could generate for under that cost, no doubt, but that value then doesn't drive you to make that capital investment,

which you probably could not pay back based on that installed capacity limitation, and that's the evaluation that those folks go through. So it just doesn't pay for itself. It's a very small amount of time.

MR. AUSTIN CARROLL: Okay. A small amount of time everyday?

DR. KATE JACKSON: No. We rarely spill.

MR. PHIL COMER: In the tributary dams it's almost nil.

MR. AUSTIN CARROLL: Well, how many days did we say we spilled at Kentucky?

MR. PHIL COMER: That was in the big dam.

MS. JANET HERRIN: At Chickamauga we spill I think some part of maybe 50 to 100 days. Chickamauga is a bottleneck. We do spill at

Chickamauga to get that water downstream to Wheeler, Wilson, Pickwick and Kentucky, because if we don't get it down there, we're not generating with it and it's stuck essentially behind Chickamauga.

At Kentucky we're spilling some part of -- I think I said 100 days at Kentucky, some part of 100 days. It's not 24 hours necessarily, seven days a week, and that's an average number.

MR. AUSTIN CARROLL: Okay. I just envisioned --

MR. PHIL COMER: The tributary is practically zero.

MS. JANET HERRIN: No. We're talking about -- I hit the main river plants, those are the biggest spills. There's some projects that we very rarely spill at.

MR. AUSTIN CARROLL: When you said that, I guess I'm sitting here thinking, well, that

water is pouring over that dam constantly for 100 days, you know, that's a lot of water.

MS. JANET HERRIN: Not necessarily.

CHAIRMAN BRUCE SHUPP: Jimmy and then Miles.

MR. JIMMY BARNETT: Going back to communication, I know that TVPPA works closely with

TVA in times of emergency, storms and so forth, and all the individual systems work closely with those particular groups also and with each other in certain cases.

Let's put on the multi-utility hat since I ran one up until the first of the year a multi-utility unit and go to the water end of it. We have water intakes. I guess I would like to ask how your feeling is about the communication between the individual systems that have water intakes and outflows and communication between the states, the utilities, TVA, the Corps, whoever, is that as good as TVPPA's notification and working with everyone?

MS. JANET HERRIN: Well, I guess since you wore that other hat, I will turn it around eventually and ask you that question, but let me start out by saying that notification directly that you heard Wayne talk about in river scheduling, we have phone calls that we make to water distributors where we know that we're going to have a problem with their intake.

Particularly in dry conditions, we will talk to the distributors, let them know when we think there's going to be problems. We will actually work with them to try to sandbag an area around their

intake so that they have water long-term.

Do we hit them all? We hit the ones that talk to us.

I will turn it around now and ask you,

from your perspective, is that communication as good?

MR. JIMMY BARNETT: I never had a problem with a drought condition. I had one problem that scared me to death right after I first went there. Someone called and said the water is going to be at this elevation and hung up the phone. I thought a minute. The elevation of our intake, that's not going to work. We're going to swamp the motors and everything else.

So I got excited and got everybody stirring around there and we all went down to see what we could do. The superintendent finally went and talked to the TVPPA folks and said, that's the elevation right below the dam, and it's, you know, some distance from the dam down to our particular thing, so it would drop down below that, but I know I had some tense moments there for a little bit. I thought I was going to lose water for the whole city. That, I guess, prompted my question.

I do have a question for Mr. Ensch from the Corps where I had -- maybe I can talk with

you later and don't bother everyone else with this particular thing.

MR. PHIL COMER: I want to know what you want to know.

MR. JIMMY BARNETT: It's about an obstruction there in the river where we drop a million gallons a day into the river because the stormwaters came down through the river and picked up a piece of our -- three sections of our pipe, put them out of alignment, and we couldn't get a barge to work on them because of one particular obstruction.

MR. PHIL COMER: Talk to him later.

CHAIRMAN BRUCE SHUPP: Miles and then Ken.

MS. MILES MENNELL: It's just a clarifying question, Janet. You said there was a

company in the Valley looking at doing pump storage?

MS. JANET HERRIN: There was a company that came into the Valley.

MS. MILES MENNELL: Past tense?

MS. JANET HERRIN: Past tense.

MS. MILES MENNELL: That's what I wanted to know. There's not one currently?

MS. JANET HERRIN: Not to my knowledge. They were in the Sequatchie Valley five,

ten years ago. It's been awhile.

DR. KATE JACKSON: I think five and ten years ago.

MS. MILES MENNELL: I wasn't sure if there was someone new.

DR. KATE JACKSON: It keeps on coming back.

MS. MILES MENNELL: Does it really?

DR. KATE JACKSON: Oh, yeah.

MS. MILES MENNELL: That was my other question, is this the same outfit, Armstrong or whatever it was?

DR. KATE JACKSON: It's a merged group.

MS. JANET HERRIN: Similar faces,

maybe different names.

MS. MILES MENNELL: Interesting. Thank you.

MR. KENNETH DARNELL: Given on these dams and bridges and power plants and locks and things and all of the different things that could happen to them, what does TVA think is the one disaster that is the highest probability of having?

MR. PHIL COMER: I don't think you could answer that. We would establish panic

throughout the whole Valley.

MR. KENNETH DARNELL: Or might give

someone an idea.

MR. PHIL COMER: We will just all speculate tonight.

MS. MILES MENNELL: That's true.

MS. JANET HERRIN: And I appreciate that, Phil. From my perspective and from my background, what you have to understand, water resources, engineering, particularly focused on floods, I have to say that I think about flooding a lot.

MR. KENNETH DARNELL: Thank you.

CHAIRMAN BRUCE SHUPP: Any other questions?

Thank you and your staff for a very informative and motivated and interesting day.

MS. JANET HERRIN: Thank you.

CHAIRMAN BRUCE SHUPP: All right. One more thing before we adjourn, and after we adjourn, don't run away because we're going to get instructions on the evening activities, afternoon and evening activities.

Dave is going to go over the questions we're going to address tomorrow.

FACILITATOR DAVE WAHUS: You should have all received a copy of the questions in advance. There is one in your white folder that's on your desk.

You have been asked to respond to the following six questions:

How do you perceive the adequacy of TVA's infrastructure stewardship activities?

Do you have any suggestions for improvements in TVA's infrastructure stewardship activities?

How do you perceive the adequacy of TVA's emergency preparedness and coordination efforts with U.S. Army Corps of Engineers and state and local

agencies?

Do you have any suggestions for improvement in TVA's emergency preparedness and coordination efforts?

Has TVA considered a full range of options for Bear Creek Dam?

The sixth question is related to that as well. What other options should be considered? And you will be hearing about Bear Creek Dam tomorrow morning.

Some interesting questions. Depending

how you look at them, they could be easy or very difficult to answer. I think we will have a good discussion tomorrow and look forward to it.

CHAIRMAN BRUCE SHUPP: Thank you, Dave.

MR. TOM LITTLEPAGE: Question six, the subject, if you have other ideas, what are they related to Bear Creek?

FACILITATOR DAVE WAHUS: Yes.

CHAIRMAN BRUCE SHUPP: Anything else official business before we adjourn for the day?

All right. Meeting adjourned until 8:00 tomorrow morning. Now, we will have Wayne Poppe tell us about the afternoon tour and Rick Driggans talk to us about dinner tonight.

(Council meeting was adjourned until May 11, 2006 at 8:00 a.m.)